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(54) Document display system and electronic dictionary

tents of an electronic displays system displays the conforms of an electronic document. If the user requests distributing invisible dictionary access information to words in the document. The modified document is then words in the document. The modified document is then displayed, the words to which the dictionary access information is attached being visibly marked. If the user information is attached to which dictionary access information is attached, an electronic dictionary access information is attached, an electronic dictionary access information is attached, an electronic dictionary access information is automatically retrieved and displayed.

ument to look up words in that document in an elecprovide an easy way for the reader of an electronic doc-An object of the present invention is accordingly to

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computer.

to store a large number of dictionaries on his or her own tionary. It is furthermore inefficient for each user to have electronic dictionaries, or even for one electronic dicbrowsing software also to pay for a large number of nor is it reasonable to expect a person who purchases tionaries that might be required by all potential users, it is not practical to equip such browsing with all the dicthat incorporated an electronic dictionary internally, but The problem could be solved by browsing software

become an irksome and time-consuming process. When there are many words to be looked up, this can in the usual manner, by typing the word separately. of a word, the user must access the electronic dictionary entries in electronic dictionaries, so to find the meaning hypertext documents are not designed for displaying word in a document. Conventional systems that display ease with which the person can look up an unknown from one document to another is not matched by the tunately, the ease with which a person can proceed aid to the comprehension of such documents, but unfor-Electronic dictionaries can be an extremely useful

ments on many specialized subjects. contact with documents in many languages, and docuhypertext documents, have brought many users into availability of software that facilitates browsing through into a so-called world-wide web, and the commercial The linking of computer resources throughout the world by selecting the indicated items with a pointing device. user can proceed from one document to another simply marked as being linked to other documents, and the In a hypertext document, certain items (e.g. words) are been greatly facilitated by the emergence of hypertext. networks. The retrieval of such documents has recently ple who retrieve electronic documents from computer

Among the users of electronic dictionaries are peodictionaries of foreign languages. types of electronic dictionaries are available, including of the word then appears on a display screen. Various ary, the user types the word on a keyboard; the meaning device. To look up a word in such an electronic dictionaccessible to a personal computer or other electronic media, such as disks, that make the dictionary entries Dictionaries have recently become available on

tronic dictionary. electronic document to be looked up easily in an eleca document display system that enables words in an system and an electronic dictionary, more particularly to The present invention relates to a document display 5

BACKGROUND OF THE INVENTION

Description

words can be advantageously be looked up.

reader of a hypertext document to look up words in that A further object is to provide an easy way for the

tronic dictionary.

how frequently different character strings have been the document display system keeps records indicating According to a still further aspect of the invention, described above.

character string is displayed by one of the methods a character string in the item, the dictionary entry of the menu is displayed; then, if the user chooses to look up strings in the item. If the user selects the item, first the to retrieve the other document or look up character erating a menu that allows the user to choose whether document display system attaches information for genalready has a hypertext link to another document, the attaching dictionary access information to an item which According to a further aspect of the invention, when

found in the electronic dictionary, it is displayed to the in the electronic dictionary. If the corresponding entry is executes a command to look up a corresponding entry attached, the document display system receives and string to which dictionary access information is look-up commands. When the user selects a character the dictionary access information comprises dictionary According to yet another aspect of the invention,

prises hypertext links to these separate documents. hypertext link. The dictionary access information coma separate document, which can be retrieved via a electronic dictionary and stores each extracted entry as system also extracts the corresponding entries from the dictionary access information, the document display link information. When attaching the above-mentioned electronic dictionary is not provided with such hypertext

According to another aspect of the invention, the pointing to entries in the electronic dictionary. tionary access information comprises hypertext links

this aspect of the invention, the above-mentioned dicaccessible via hypertext links from other documents. In tion making the entries in the dictionary individually tronic dictionary is provided with hypertext link informa-

According to one aspect of the invention, the electhat effect is displayed.

tionary for the selected character string, a message to and displayed. If there is no entry in the electronic dicdescribing the character string is automatically retrieved attached, an electronic dictionary entry defining or string to which such dictionary access information is ument is displayed. If the user then selects a character individual words in the document, and the modified doctionary access information to character strings such as the electronic document is modified by attaching dictronic dictionary. If the user requests dictionary access, trol item enabling the user to request access to an eleccontents of an electronic document together with a con-The invented document display system displays the

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employed; EIG. 19 is a block diagram of a second embodiment

unknown words; FIG. 18 shows a message displayed when the alternative method of handling unknown words is

play in FIG. 15; FIG. 17 shows a display obtained from the result file in FIG. 9, illustrating one method of handling

played in dictionary-access mode; FIG. 16 shows an example of information displayed when dictionary access is performed from the dis-

FIG. 14 illustrates a further document retrieved by a hypertext link from the document in FIG. 13; FIG. 15 illustrates the document in FIG. 14 dis-

FIG. 13 illustrates a document retrieved from the display in FIG. 12;

in the tagged electronic dictionary; FIG. 12 illustrates an initial document retrieval dis-

method of handling unknown words; FIG. 11 illustrates an alternative result file output by the dictionary linker when a word cannot be found

the tagged electronic dictionary; FIG. 10 illustrates an unknown-word entry provided in the tagged electronic dictionary as an alternate

FIG. 9 illustrates part of a result file output by the dictionary linker when a word cannot be found in the tagged electronic dictionary;

FIG. 8 illustrates part of a result file output by the dictionary linker in the first embodiment;

dictionary linker in the first embodiment;

button to another document; FIG. 7 is a flowchart illustrating the operation of the

button to a document; FIG. 6 illustrates the addition of an ordinary mode

client device in the first embodiment; FIG. 4 is a flowchart illustrating the operation of the linked document server in the first embodiment; FIG. 5 illustrates the addition of a dictionary mode

electronic dictionary in the first embodiment; FIG. 3 is a flowchart illustrating the operation of the

the invented document display system; FIG. 2 shows part of the contents of the tagged electronic dictionary in the first embodiment:

FIG. 1 is a block diagram of a first embodiment of

In the attached drawings:

BRIEF DESCRIPTION OF THE DRAWINGS

According to a yet further aspect of the invention, the document display system varies the way in which character strings in the modified electronic document are displayed, according to the above records, to help the user decide which character strings to look up.

basis of these records.

looked up in the past, or how frequently dictionary access information has been attached to different character strings and how frequently the character strings have been looked up, and decides wheth r to attach dictionary access information to character strings on the

ment; the dictionary linker in the seventh embodiment; the dictionary linker in the seventh embodiment;

FIG. 42 is a block diagram of a seventh embodiment of the invented document display system; FIG. 43 is a flowchart illustrating the operation of the linked document server in the seventh embodi-

nent; =16, 42 is a block diagram of a seventh embodi-

the invented document display system; FIG. 41 is a flowchart illustrating the operation of the dictionary entry extractor in the sixth embodi-

ment; HG. 40 is a block diagram of a sixth embodiment of

dictionary linker in the fifth embodiment; FIG. 39 is a flowchart illustrating the operation of the dictionary entry extractor in the fifth embodi-

the dictionary linker in the fifth embodiment; FIG. 38 illustrates part of a result file output by the dictionary linker in the fifth embodiment:

the invented document display system; FIG. 37 is a flowchart illustrating the operation of

ment; FIG. 36 is a block diagram of a fifth embodiment of

dictionary linker in the fourth embodiment; FIG. 35 is a flowchart illustrating the operation of the dictionary entry extractor in the fourth embodi-

ure archonary inneer in the fourth embodiment; FIG. 34 illustrates part of a result file output by the dictionary linker in the fourth embodiment;

ment; HG. 33 is a flowchart illustrating the operation of the dictionary linker in the fourth embodiment;

of the invented document display system; FIG. 32 is a flowchart illustrating the operation of the linked document server in the fourth embodi-

dictionary linker in this variation; FIG. 31 is a block diagram of a fourth embodiment

the dictionary linker in this variation; FIG. 30 illustrates part of a result file output by the

third embodiment; FIG. 29 is a flowchart illustrating the operation of

embodiment; FIG. 28 is a flowchart illustrating the operation of the dictionary entry extractor in a variation of the

FIG. 27 shows an example of information displayed when dictionary access is performed in the third

dictionary linker in the third embodiment; FIG. 26 is a flowchart illustrating the operation of the dictionary entry extractor in the third embodi-

the dictionary linker in the third embodiment; FIG. 25 illustrates part of a result file output by the

tronic dictionary in FIG. 22; FIG. 24 is a flowchart illustrating the operation of

the invented document display system; FIG. 23 illustrates part of the contents of the elec-

step in FIG. 20; FIG. 22 is a block diagram of a third embodiment of

of the invented document display system; FIG. 20 is a flowchart illustrating the operation of the dictionary linker in the second embodiment; FIG. 21 is a flowchart illustrating the tag attachment

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attached drawings.

tern will be described below with reference to the Various embodiments of the invented display sys-

DETAILED DESCRIPTION OF THE INVENTION

the ratio calculator in the tenth embodiment. FIG. 66 is a flowchart illustrating the operation of the dictionary linker in the tenth embodiment; and FIG. 65 is a flowchart illustrating the operation of the invented document display system;

FIG. 64 is a block diagram of a tenth embodiment of

dictionary linker 4 in a variation of the ninth embod-FIG. 63 illustrates part of a result file output by the :namibodms

played in dictionary-access mode by the ninth FIG. 62 illustrates the document in FIG. 14 disthe ninth embodiment;

dictionary linker 4 and linked document server 2 in FIG. 61 illustrates part of a result file output by the embodiment;

tion of the dictionary access tabulator in the ninth FIG. 60 is another flowchart illustrating the opera-

the dictionary access tabulator in the ninth embodi-FIG. 59 is a flowchart illustrating the operation of

dictionary access tabulator in the ninth embodi-FIG. 58 illustrates part of a table maintained by the the dictionary linker in the ninth embodiment,

FIG. 57 is a flowchart illustrating the operation of

the linked document server in the ninth embodi-FIG. 56 is a flowchart illustrating the operation of the invented document display system;

FIG. 55 is a block diagram of a ninth embodiment of eighth embodiment in the dictionary-access mode; FIG. 54 illustrates a document displayed by the

the link remover in the eighth embodiment; FIG. 53 is a flowchart illustrating the operation of of the invented document display system;

FIG. 52 is a block diagram of an eighth embodiment selected for dictionary access;

FIG. 51 shows the same menu with "message" selects a certain button in the display in FIG. 49; FIG. 50 shows a menu displayed when the user the dient device;

FIG. 49 shows how this result file is displayed by seventh embodiment;

dictionary linker and linked document server in the FIG. 48 illustrates part of a result file output by the by the client device;

FIG. 47 shows how this document file is displayed

the linked document server in the seventh embodi-FIG. 46 illustrates part of a document file output by the menu generator in the seventh embodiment; FIG. 45 is a flowchart illustrating the operation of

conventional electronic dictionaries in being provided operate. The tagged electronic dictionary 5 differs from the linked document server 2 and dictionary linker 4 the memory of the workstation or computer on which example, a file stored on a magnetic or optical disk, or in The tagged electronic dictionary 5 comprises, for

activated by the linked document server 2. server 2 to the client device 1. The dictionary linker 4 is hypertext links to a file provided by the linked document is to refer to the tagged electronic dictionary 5 and add function of the dictionary linker 4 in the first embodiment dictionary linker 4 as the linked document server 2. The program running on the same workstation or computer

The dictionary linker 4 comprises, for example, a the form of computer-accessible files.

and which stores a plurality of electronic documents in physically integrated with the linked document server 2, example, a magnetic or optical disk drive, which may be The electronic document store 3 comprises, for

and for other functions that will be described below. It estimates the state of the client device 1, electronic document files from the electronic document communication functions and software for retrieving ple, a workstation or computer system equipped with

The linked document server 2 comprises, for examdevice 1.

and select character strings can serve as the client user to enter commands, display retrieved documents, prise a personal computer. Any device that enables the The client device 1 of course does not have to com-

strings, or other items in the displayed documents. which the user can select individual words, character has a pointing device such as a so-called mouse, with electronic document store 3. The client device 1 also mands that retrieve and display documents stored in the ment server 2, thereby enabling the user to enter coma browsing program, that interacts with the linked docusonal computer provided with a client program, such as

The client device 1 comprises, for example, a permultiple client devices 1 disposed in different locations. part of a public telephone network. There may also be through a communication channel, which may include ment server 2 is accessible from the client device 1 and tagged electronic dictionary 5. Each linked docuits own electronic document store 3, dictionary linker 4, document servers 2 located at different sites, each with shown in the drawing, there may be a plurality of linked Although one linked document server 2 is novel features of the present invention.

dictionary linker 4 and tagged electronic dictionary 5 are vided in conventional document display systems. The 2, and electronic document store 3 are facilities proas shown. The client device 1, linked document server tagged electronic dictionary 5, which are interconnected tronic document store 3, a dictionary linker 4, and a a client device 1, a linked document server 2, an elec-Referring to FIG. 1, the first embodiment comprises

First Embodiment

s

1 (step 206).

mode button.

Details will be given later. lar command, specifically, a tag attachment command. server 2 is always either a file descriptor or one particument that the information sent to the linked document other than "Quit," it will be assumed in the first embodi-

dictionary linker 4 (step 203), at the same time providing command, the linked document server 2 activates the store 3 (step 202). If the information is a tag attachment requested document from the electronic document descriptor, the linked document server 2 reads the ment command (step 201). If the information is a file tilies the information as a file descriptor or tag attachdevice 1 (step 200). The linked document server 2 idenstarts with the reception of information from the client edly executes the process shown in FIG. 4. The process will be described. The linked document server 2 repeat-Next, the operation of the linked document server 2

If the information received in step 200 is a file rently being displayed by the client device 1. the dictionary linker 4 with a copy of the document cur-

tag (VA)). The user sees the words "Dictionary mode." followed by the words "Dictionary mode," then a closing bin/into_the_dic" in a hypertext reference (HREF) tag, server 2 adds a line 21 containing the command "/cgimode button to this document, the linked document "We draw on vast storehouses...." To add a dictionary shows part of a document 21 that begins with the words various ways, one of which is illustrated in FIG. 5, which These control items can be added to the document in

(step 207), and sends the document to the client device

nary mode button, to the resulting modified document

nary-mode control item, referred to below as an ordi-

later. The linked document server 2 then adds an ordi-

information comprises tags which will be described

dictionary access information. The dictionary access

in step 203 modifies the provided document by adding

attachment command, the dictionary linker 4 activated

dient device 1 (step 206) without adding a dictionary

the linked document server 2 sends the document to the

1 (step 206). If the document is a hypertext document,

(step 205), then sends the document to the client device

to below as a dictionary mode button, to the document

server 2 adds a dictionary-mode control item, referred

ment is not a hypertext document, the linked document

ment is a hypertext document (step 204). If the docu-

linked document server 2 decides whether the docu-

descriptor, after obtaining the document in step 202, the

If the information received in step 200 is a tag

the tag attachment command mentioned above. linked document server 2, "/cgi-bin/into_the_dic" being sends the character string "/cgi-bin/into_the_dic" to the When the user selects these words, the dient device 1 an ordinary mode, at the user's own convenience. device to switch between a dictionary-access mode and ton are items that the user can select with the pointing The dictionary mode button and ordinary mode but-

FIG. 6 illustrates the similar addition of an ordinary

Although the user may giv various commands

linked to the document now on display. example, for the user to request a further document process returns to step 101 to wait for further input: for 1 receives and displays (step 104). After step 104, the ing back an electronic document, which the client device linked document server 2 generally responds by sendmation to the linked document server (step 103). The "Quit" generally cause the client device 1 to send infor-(step 102). File descriptors and commands other than access to the document display system is terminated mand such as "Quit." If the "Quit" command is given, descriptor requesting an electronic document, or a cominput from the user (step 101). The input may be a file displays an initial input screen (step 100), then waits for the document display system, the client device 1 first described. Referring to FIG. 3, when the user accesses First, the operation of the client device 1 will be

text documents. these documents may be the targets of links from hypernot be described as hypertext documents, even though contain embedded links pointing to other documents will tagged electronic dictionary 5, documents that do not be referred to as a hypertext document. Except for the document. The tagged electronic dictionary 5 will also either to the tagged electronic dictionary 5 or to another document having embedded hypertext links pointing term "hypertext document" will refer to an electronic ment" will sometimes be shortened to "document." The described. In the description, the term "electronic docu-

Mext, the operation of the first embodiment will be able to a plurality of server systems.

tionary linker 4 and tagged electronic dictionary 5 availlinked document servers, making the facilities of the diccation lines to the linked document server 2 and to other an independent system that is coupled by telecommuni-4 and tagged electronic dictionary 5 may also reside in electronic document store 3 reside. The dictionary linker tem in which the linked document server 2 and ter system or a specialized system coupled to the sys-The dictionary linker 4 can reside in a separate compuand electronic document store 3, this is not necessary. or computer system as the linked document server 2 tronic dictionary 5 may reside in the same workstation

Although the dictionary linker 4 and tagged elecwell-known hypertext markup language (HTML). entry. These tags 11 and 13, incidentally, conform to a is a closing tag 13 indicating the end of the dictionary nese definition of the meaning of the word. The next line house" appearing as the heading, followed by a Japaheading and body of this entry 12, the word "storenamed "storehouse." The next two lines constitute the is an opening tag 11 that anchors a dictionary entry

the tagged electronic dictionary 5. The first line in FIG. 2 FIG. 2 shows an example of part of the contents of Japanese dictionary.

that the tagged electronic dictionary 5 is an English-toments. In the following description, it will be assumed with tags that can anchor links from hypertext docu-

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the document (e.g. "We"), then a closing tag (AA). tionary 5. This is followed by the word as it appeared in the entry for the word "we" in the tagged electronic dic-HREF = "tagED#we"), which is a hypertext reference to ary 5. Each line begins with an opening tag such as (A

processing is adopted, step 507 in FIG. 7 is a no-operaopening or closing tags. If this type of unknown-word ary linker 4 writes "vast" in the result file without any this example consists of doing nothing at all; the dictiontronic dictionary 5. The unknown-word processing in which the word "vast" is not defined in the tagged elecword processing, taking as an example the case in FIG. 9 illustrates one possible type of unknown-

tion step, and can be omitted.

unknown word, as illustrated in the fourth line in FIG. 11. generated and written in the result file around the linking that word to this special unknown-word entry are (e.g. "vast") in the tagged electronic dictionary 5, tags tionary." When the dictionary linker 4 cannot find a word jisho ni arimasen," meaning "That word is not in the dicentry is a Japanese sentence, read as "Sono tango wa unknown words, shown in FIG. 10. The body of this the tagged electronic dictionary 5 has a special entry for sible type of unknown-word processing. In this example, FIGs. 10 and 11 show an example of another pos-

transferred to the system of the linked document server ory of its own system after the result file has been tionary linker 4 may delete the result file from the memdictionary linker 4 reside in different systems, the dicdevice 1. Similarly, if the linked document server 2 and so that a copy of the result file remains only at the client station in which the linked document server 2 resides, tile from the memory of the computer system or workdevice 1, the linked document server 2 may delete this linked document server 2 and transferred to the client temporary tile. After the result file has been output to the The result file created by the dictionary linker 4 is a

another in which an unknown word is processed as in an unknown word is processed as in FIG. 9; and in which there are no unknown words; another in which Three cases of dictionary access will be illustrated: one will be described, with reference to FIGs. 12 to 18. Next, the overall operation of the first embodiment

FIGs. 10 and 11.

buttons move forward and backward in a series of docto send the document again. The "Forward" and "Back" rently on display, causing the linked document server 2 ment server 2 the file descriptor of the document curis selected, the client device 1 sends the linked docucommand described above. When the "Reload" button ton with a pointing device, the user enters the "Quit" ward," "Reload," and "Quit." By selecting the "Quit" buttop of this screen are four buttons marked "Back," "Forone in FIG. 12, which the dient device 1 displays. At the sending back the contents of an initial screen like the server 2. The linked document server 2 responds by sends certain initial information to the linked document When first activated by the user, the client device 1

> Server 2. send the file descriptor "slogan" to the linked document with the pointing device, causing the client device 1 to user can select the words "Ordinary mode" in line 32 device 1 when the dictionary linker 4 was activated. The document in FIG. 5, which was on display at the client hypertext reference "slogan" is the file descriptor of the linked document server 2 adds a line 32 in which the of the document in FIG. 5, as will be shown later. The body 31 is displayed in nearly the same way as the body has much embedded dictionary access information, the tionary linker 4. Although the body 31 of the document mode button to a modified document output by the dic-

file (step 501). The result file is created as a new file, (step 500). Next, the dictionary linker 4 creates a result this document from the electronic document store 3 device 1, or (equivalently) receives permission to read copy of the document currently on display at the client begins by receiving from the linked document server 3 a described. Referring to FIG. 7, the dictionary linker 4 Next, the operation of the dictionary linker 4 will be

analysis of the document obtained in step 500. By The dictionary linker 4 now performs a morphemic and is initially empty.

storehouse" as the dictionary form. appears, for example, the dictionary linker 4 identifies ary forms of these words. If the word "storehouses" the words appearing in the document, and the dictionmeans of this analysis, the dictionary linker 4 identifies

unprocessed word remains. When no unprocessed in which the dictionary linker 4 determines whether any one line to the result file. Step 503 is a loop control step word remains in the document, each repetition adding form a loop that is repeated as long as any unprocessed The subsequent steps from step 503 to step 507

When an unprocessed word is found in step 503, above (step 508). ument server 2 as the modified document mentioned word remains, the result file is output to the linked doc-

generated by the unknown-word processing (step 506). result file, together with any tags that may have been tionary linker 4 then writes the unknown word in the 506), two examples of which will be given later. The diccarries out appropriate unknown-word processing (step tagged electronic dictionary 5, the dictionary linker 4 to process the next word. If the word is not defined in the itself in the result file (step 506), and returns to step 503 ing the word (step 505), writes these tags and the word lishing a link from the word to the dictionary entry defindictionary access information comprising tags estabthe definition is found, the dictionary linker 4 generates word) in the tagged electronic dictionary 5 (step 504). If (i.e. for an entry headed by the dictionary form of the the dictionary linker 4 looks for a definition of the word

these words are defined in the tagged electronic dictionto evil lis nertw "...eesuorienst star no wash eW" ritiw put by the dictionary linker 4 for a document beginning FIG. 8 shows the first five lines of the result file outand returns to step 503. document.

dictionary 5 that were added by the dictionary linker 4. the presence of hypertext links to the tagged electronic the document is underlined, the underlines indicating now sees the display shown in FIG. 15. Each word in

pointing device. The client device 1 sends the informaword "storehouses," the user selects this word with the To find the Japanese meaning of, for example, the

house" and other words. If he wants to, the user can FIG. 16, which gives Japanese definitions for "store-The client device 1 then displays the screen depicted in ceding and following entries, back to the dient device 1. sends that entry, together with a certain number of pretionary 5 at the entry indicated by this information, and document server 2 accesses the tagged electronic dicto this word to the linked document server 2. The linked tion "tagED#storehouse" contained in the tag attached

"Back" button in FIG. 16. The client device 1 then disthe modified document display, the user selects the To return from this display of dictionary meanings to "storehouse." meanings of other words in alphabetical sequence with scroll this screen up or down to display the Japanese

can select the ordinary mode button in FIG. 15 to have When the user has finished looking up words, he with the pointing device. houses" was looked up, by selecting the desired word user to look up other words in the same way that "storeplays the screen shown in FIG. 15 again, enabling the

the linked document server 2, and displays the received the unmodified "Global Slogan" document again from ment to the linked document server 2 again, receives sends the file descriptor of the "Global Slogan" docudisplays the retained copy; otherwise, the client device 1 1 retains a copy of this document, the client device 1 ordinary mode, as shown in FIG. 14. If the client device the "Global Slogan" document displayed again in the

because this word has no dictionary access information selects "vast" with the pointing device, nothing happens, FIG. 17, in which "vast" is not underlined. If the user instead of the display in FIG. 15, he sees the display in then when the user selects the dictionary-access mode, method shown in FIG. 9 of dealing with unknown words, tronic dictionary 5, and the dictionary linker 4 adopts the If the word "vast" is not defined in the tagged electhe document in FIG. 15 will be shown.

Next, examples in which unknown words appear in

in attempting to look up words that are not defined. tronic dictionary 5, so that the user need not waste time are and which words are not defined in the tagged elechas the advantage of indicating to the user which words attached. This method of processing unknown words

JagED#UNKNOWN WORDS" to the linked document word "vast," the client device 1 sends the information display shown FIG. 15. If the user tries to look up the selecting the dictionary mode button, the user sees the is not defined in the tagged electronic dictionary 5, after ing with unknown words is adopted, then even if "vast" If the method illustrated in FIGs. 10 and 11 of deal-

defined in the tagged electronic dictionary 5, the user If all words in the "Global Slogan" document are the word "slogan" in the first line 32 of FIG. 6.

descriptor of the "Global Slogan" document, shown as preceding the ordinary mode button contains the file ing modified document to the client device 1. The tag nary mode button to the result file, and sends the resultresult file, the linked document server 2 adds an ordilinker 4 has looked up all words and completed the shown, for example, in FIG. 8. When the dictionary and attaches tags to create a result file as was partially in this document in the tagged electronic dictionary 5,

electronic document store 3 again, looks up the words server 2 retrieve the "Global Slogan" document from the

The dictionary linker 4 has the linked document activating the dictionary linker 4.

document server 2 executes this command, thereby ceding the words "Dictionary mode." The linked

mand ("/cgi-bin/into_the_dic") contained in the tag prethe linked document server 2 the tag attachment combutton with the pointing device, the client device 1 sends ordinary mode. If the user selects the dictionary mode

The operations so far have been carried out in the .ınəmu

instead of first retrieving the "Corporate Guidance" doctor of this document on the initial screen in FIG. 12, Slogan" document directly, by entering the file descrip-Incidentally, the user could also retrieve the "Global

attaches a dictionary mode button.

being used herein, and the linked document server 2 hypertext document in the sense in which the term is ument has no links to further documents, so it is not a 1 displays this document as shown in FIG. 14. This docdocument back to the dient device 1. The client device from the electronic document store 3 and sends the ment server 2 retrieves the specified further document gan" line but is not visible to the user. The linked docuhypertext reference tag that precedes the "Global Slother document. This file descriptor is contained in a the linked document server 2 the file descriptor of a furline with the pointing device, the client device 1 sends If the user selects, for example, the "Global Slogan"

dictionary mode button is attached or displayed. lines. Since this document is a hypertext document, no hypertext links, and are marked as such with underthe client device 1. The three lines below the title are device 1, and which is now displayed on the screen of the electronic document store 3 and sent to the client which the linked document server 2 has retrieved from of a hypertext document entitled "Corporate Guidance,"

In FIG. 13, the user has entered the file descriptor back the requested document file. descriptor to the linked document server 2, which sends document. The client device 1 sends the entered file which the user can enter the file descriptor of a desired

Below these buttons, the initial screen has a line on all screens in the first embodiment. text links. These four buttons are displayed at the top of uments that the user has accessed by means of hyper-

Second Embodiment

The second embodiment differs from the first embodiment in that the result files generated by the dictionary linker 4 are saved for possible future use.

tem in which both the linked document server 2 and tem in which the dictionary linker 4 resides, or the syswhich the linked document server 2 resides, or the sysincorporated into the workstation or computer system in dictionary-access-ready document store 6 may be device such as an external disk drive. Alternatively, the dictionary linker 4. This device may be an independent ory device coupled to the linked document server 2 and ment store 6 is, for example, a magnetic or optical memdictionary linker 4. The dictionary-access-ready docustore 6, which stores the result files generated by the and an additional dictionary-access-ready document tagged electronic dictionary 5 as the first embodiment, electronic document store 3, dictionary linker 4, and the same client device 1, linked document server 2, Reterring to FIG. 19, the second embodiment has

dictionary linker 4 reside. Next, the operation of the second embodiment will

be described.

The linked document server 2 operates as in the first embodiment, following the flowchart in FIG. 4, except that under certain conditions, the modified document (result file) to which an ordinary mode button is added in step 207 is obtained from the dictionary-access-ready document store 6 instead of from the dictoresserved.

tionary linker 4.

The operation of the dictionary linker 4 differs from the first embodiment, and is illustrated in FIGs. 20 and 21. Referring to FIG. 20, when activated, the FIG. 4 begins by obtaining a copy of the unmodified document currently on display at the client device 1 (step 300). This step is the same as step 500 in FIG. 7.

Next, the dictionary linker 4 searches the directory of the dictionary-access-ready document store 6 to see if the dictionary-access-ready document store 6 already contains a result file for this document (step 301). If it does, the dictionary linker 4 compares the time stamp on the unmodified document with the time stamp on the result file to determine whether the document stored in the electronic document store 3 has been updated since the result file in the dictionary-access-ready document the result file in the dictionary-access-ready document

store 6 was created (step 302).

If the document in the electronic document store 3 has not been updated since the result file in the dictionary-access-ready document store 6 was created, the dictionary linker 4 checks whether the result file in the dictionary-access-ready document store 6 is locked dictionary-access-ready document after 6 is locked currently being tagged in response to a request from a currently being tagged in response to a request from a different dient device. The check in step 303 is repeated different dient device. The check in step 303 is repeated time the document is found not to be locked, at which time the dictionary linker 4 notifies the linked document server 2 server 2 (step 304), and the linked document server 2 transfers the result file from the dictionary-access-ready transfers the result file from the dictionary-access-ready

server 2, which accordingly accesses the special unknown-word entry in the tagged electronic dictionary 5. As a result, the user sees the screen displayed in FIG. 18, with a Japanese message meaning "That word is not in the dictionary." This method has the advantage of explaining to the user why the word cannot be looked up. The user can use the "Back" button to return from this screen to the display in FIG. 15.

When a user follows a series of hypertext links to a document written in a foreign language, the first embodiment assists the user in reading the document in a natural and intuitive way: to look up words, the user points to the words "Dictionary mode," then simply points to the words to be looked up. The user does not have to learn any special operations or do any extra typing.

The first embodiment is efficient in that it displays only the definitions the user wants to see, and does not attempt to display the meaning of every word in a document, or translate the entire document. The amount of information transferred between the client device 1 and linked document server 2 can thus be held to a minitinked document server 2 can thus be held to a minitality and needless delays can be avoided. If the mum, and needless delays can be avoided. If the ductor memory, or is loaded from a disk memory into a semiconductor memory when the linked document semiconductor memory when the linked document server 2 is started up, the tagged electronic dictionary 5 server 2 is started up, the tagged electronic dictionary 5 server 2 is started up, the tagged electronic dictionary 5 server 2 is started up, the tagged electronic dictionary 5 can be accessed by means of internal memory pointers.

enabling the user to obtain definitions very quickdy.

The first embodiment is also efficient in that it enables dictionary definitions to be accessed without requiring tags with links to dictionary entries to be embedded in the documents stored in the electronic document store 3. Thus users who do not need to use the dictionative will not be distracted by unnecessary underlines in ary will not be distracted by unnecessary underlines in

store 3. Thus users who do not need to use the dictionator as any will not be distracted by unnecessary underlines in the documents they are reading.

Since the tagged electronic dictionary 5 is located at the site of the linked document server 2, it is not nectative site of the linked document server 2, it is not nectative site of the linked document server 2, it is not nectative site of the linked document server 2, it is not nectative site of the linked document server 3 in section 1.

Since the tagged electronic dictionary 5 is located at the site of the linked document server 2, it is not necessary for each user to purchase his own copy of the tagged electronic dictionary 5. Moreover, this site can be provided with a large number of tagged electronic dictionaries of different types, in different languages, for example, and the system can be adapted to provide the user with a choice of dictionaries.

In this case a third type of unknown-word processing is available. If a word is not found in one dictionary, the dictionary linker 4 can link the word to a menu screen offering the user a selection of other dictionaries in which the user might wish to try to look up the word, this screen being provided with links to commands that access the other dictionaries. This menu screen can be built into the tagged electronic dictionary 5, so that both brown words and unknown words are initially processed in the same way; by displaying a page from the eased in the same way; by displaying a page from the expanded by adding dictionary-access commands, without having to modify the basic operations of the without having to modify the basic operations of the linked document server 2 and dictionary linker 4.

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nese dictionary similar to the tagged electronic dictionary singlet to the tagged electronic dictionary 5 of the first embodiment, but has no embedded anchoring tags. A commercially available electronic dictionary 10. FIG. 23 shows an example of part of the electronic dictionary 10, in which each entry comprises an English word, then a Japanese definition. The Japanese definition is then a Japanese definition. The Japanese definition is by a special code represented in the drawing by a square, followed by a new-line code, then the next ontry. The special code indicates that the word on the entry. The special code indicates that the word on the next line is the heading of a new dictionary entry, and the information on the subsequent line or lines, up to the next special code, is the definition of the word given in next special code, is the definition of the word given in heading.

The electronic dictionary 10 is not limited to the format shown in FIG. 23. Electronic dictionaries in other formats can be used, as long as the format enables entry headings and definitions to be recognized.

The dictionary entry extractor 8 receives a word from the dictionary linker 4, looks this word up in the electronic dictionary 10, stores the entry of this word, comprising the word and its definition, as a separate document in the dictionary entry store 9, and provides the dictionary linker 4 with information giving the storage location of the entry in the dictionary entry store 9. For example, the dictionary entry extractor 8 can store each retrieved entry in a separate file in the dictionary entry store 9 with store 9, and provide the dictionary entry store 9 each retrieved entry in a separate of the dictionary entry store 9 such the file names. The contents of the dictionary entry store 9 can be read by the linked document server 2. Files stored in the dictionary entry store 9 can be read by the linked document server 2. hypertext documents, so the linked document server 2 does not add a dictionary mode button.

The electronic dictionary 10 can be stored as a single file on the same type of storage device as the electronic document store 3. The dictionary linker 4, dictionary entry extractor 8, dictionary entry extractor 8, dictionary entry store 9, and electronic dictionary 10 can all be incorporated into the same computer system or workstation as the linked document server 2 and electronic document server 3 and electronic dictionary entry extractor 8, dictionary entry store 9, and electronic dictionary 10 can reside in another computer system, workstation, or special device coupled to the system or electronic document store 3 reside, or linked to that system or electronic document store 3 reside, or linked to that system or workstation by a telecommunication line.

The dient device 1 and linked document server 2 operate as in the first embodiment, following the flow-charts in FIGs. 3 and 4. Upon retrieving a document that is not a hypertext document from the electronic document store 3, the linked document server 2 adds a dictionary mode button as shown in FIG. 5.

The dictionary linker 4 now operates according to the flowchart in FIG. 24. Steps 500, 501, 502, and 503 are the same as in the first embodiment, but when an unprocessed word remains in step 503, the dictionary inker 4 commands the dictionary entry extractor 8 to process the word (step 510). This process normally

document store 6 to the dient device 1.

If there is no corresponding result file in the dictionary-access-ready document store 6, giving a negative result in step 301, or if the result file is present in the dictionary-access-ready document store 6 but the original document in the electronic document store 3 has been updated, giving an affirmative result file with dictionary tionary linker 4 creates a new result file with dictionary access information (step 305), then leaves this new store 6 and notifies the linked document server 2 that the result file in the dictionary-access-ready document the result file is ready (step 306). If an old result file for the same document was present in the dictionaryaccess-ready document store 6, the new result file access-ready document store 6, the new result file

FIG. 20. The dictionary linker 4 begins by creating and locking the new result file (step 508). The locking and locking the new result file (step 508). The locking and unlocking of the result file can be carried out by, for example, manipulating an access permission bit in the directory information of the result file. When the new falle is created, the old result file, if present, is deleted. The same steps 502, 503, 504, 505, 506, and deleted. The same steps 502, 503, 504, 506, 506, and file. When no unprocessed words remain, giving a negtive result in step 503, the dictionary linker 4 unlocks ative result in step 503, the dictionary linker 4 unlocks document server 2.

From the user's point of view, the operation of the second embodiment is identical to the operation of the first embodiment, except that dictionary access is often faster. More precisely, when dictionary access from the same document is requested repeatedly, either by the request is speeded up the second and subsequent times, because the result file is already available in the dictionary-access-ready document store 6.

From the system's point of view, additional file storage space is required for the dictionary-access-ready document store 6, but the processing load is reduced, because as long as a document is not updated, a result file is created for that document only once. This advantage becomes particularly significant if words in the document are likely to be looked up by a large number of ument are likely to be looked up by a large number of

Third Embodiment

users.

The third embodiment differs from the preceding embodiments in regard to the format of the electronic dictionary.

Referring to FIG. 22, the third embodiment has the same client device 1, linked document server 2, and electronic document store 3 as the first embodiment, a generally similar dictionary linker 4, and a dictionary entry extractor 8, a dictionary entry store 9, and an electronic dictionary 10.

The electronic dictionary 10 is an English-to-Japa-

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If an unknown-word file already exists, giving an affirmative result in step 404, the dictionary entry extractor 8 passes the name of this file to the dictionary entry store 9 (step 403) without creating a new unknown-word file. If the entry of the word is already stored in the dictionary entry store 9, giving an affirmative result in step 400, the dictionary entry extractor 8 proceeds immediately to step 403 and passes the file proceeds immediately to step 403 and passes the file

If no unknown-word file is present in the dictionary entry store 9, the dictionary entry extractor 8 now creates one (step 405), giving the unknown-word file the above-mentioned predetermined name. The file contemts are, for example, a Japanese message stating that the word is not in the dictionary: more specifically, the message illustrated in FIG. 18. The dictionary entry extractor 8 then passes the name of the unknown-word extractor 8 then passes the name of the unknown-word extractor 8 then passes the name of the unknown-word processing of the unknown word.

"/dic/keep/."

If the word is not defined in the dictionary, giving a negative result in step 401, the dictionary entry extractor 8 checks whether an unknown-word file is present in the dictionary entry store 9 (step 404). The unknown-word file has a predetermined name, such as "unknown_words," for example. Step 404 is carried out by searching for this file name in the directory by searching for this file name in the directory

for this word is already stored in the dictionary entry tor the word is store 9 (etep 400). If the entry is not already stored, the dictionary entry extractor 8 attempts to look the word up in the electronic dictionary 10 (step 401). If the word is defined in the electronic dictionary 10, and stores the word from the electronic dictionary 10, and stores the entry in a file in the dictionary entry store 9 (step 402). The file name of this file is the word looked up, and the file contents are the entry read from the electronic dictionary finter are the entry read from the electronic dictionary on. The dictionary entry extractor 8 then passes the file name to the dictionary linker 4 (step 403). This compaires the dictionary linker 4 (step 403). This completes the processing of the word.

dictionary linker 4 for the document in FIG. 14. This result file is similar to the one in FIG. 6, except that the result file is similar to the one in FIG. 6, except that the dictionary entry store 9, such as "/dic/keep/storehouse" in the last line in FIG. 25. In this reference, "/dic/keep/" is the name of the directory of the dictionary entry store 9, and "storehouse" is the name of a file in which the dictionary entry for the word "storehouse" has been stored. FIG. 26 illustrates the operation of the dictionary entry extractor 8. When given a word to process, the entry extractor 8. When given a word to process, the

dictionary entry extractor 8 first determines if the entry

results in the storage of a dictionary entry for the word in the dictionary entry store 9. The dictionary linker 4 then generates hypertext tags linking the word to the dictionary any store 9 (step 511), and any entry in the dictionary entry store 9 (step 511), and writes the word and these tags in the result file (step word and these tags in the result file (step 506). When no more unprocessed words remain, the result file is output (step 508) as in the first embodiment.

Further words in the "Global Slogan" document are processed in the same way. The word "from" is encountered twice. The first time, the dictionary entry extractor 8 reads the entry for this word from the electronic dictionary 10, creates a new file named "/dic/keep/from" to the dictionary linker 4. The second "/dic/keep/from" to the dictionary linker 4. The second name, the dictionary entry extractor 8 only passes the file name "/dic/keep/from" to the dictionary linker 4, without name "/dic/keep/from" to the dictionary linker 4, without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file. Each time, the dictionary linker 4 without creating a new file.

any 10, so the dictionary entry extractor 8 checks to see whether an unknown-word file is already present in the dictionary entry store 9. By the assumption above, no unknown-word file is present, so the dictionary entry entry acreates a file named extractor 8 creates a file named "dickeep/unknown words" containing the message "dickeep/unknown words" containing the message shown in FIG. 18, and passes the file name to the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 5 was 10 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4. The dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary linker 4 writes the line (A though the dictionary line (A though the dictionary linker 4 writes the line (A though the dic

HREF = "/dic/keep/we" / We (/A).

The next two words, "draw" and "on," are processed similarly, creating files named "/dic/keep/draw" and "dic/keep/on" in the dictionary entry store 9. The word "vast," however, is not defined in the electronic dictionary and "or the dictionary entry extractor 8 checks to see any 10, so the dictionary entry extractor 8 checks to see

The dictionary entry extactor 8 checks to see whether an entry for "we" is already stored in the dictionary linker 4 tionary entry store 9. Specifically, the dictionary linker 4 searches for a file named "we" in the directory "dickeept" of the dictionary entry store 9. By the assumption above, no such file exists, so the dictionary linker 4 next looks up the word "we" in the electronic dictionary 10, reads the entire entry for this word, stores the entry as a new file named "/dic/keep/we" in the dictionary linker 4. As the file descriptor "vdic/keep/we" to the dictionary linker 4. As the first line "vdic/keep/we" to the dictionary linker 4. As the first line in the result file, the dictionary linker 4 writes the first line in the result file, the dictionary linker 4 writes the line (A

As in the first embodiment, selection of the dictionary mode button causes the client device 1 to send the command "/cgi-bin/into_the_dic" to the linked document server 2, and the linker 4. After obtaining a copy of the "Global Slogan" document from the linked document server 2, creating a new result file, and performing a morphemic analysis, the dictionary linker 4 passes the first word mic analysis, the dictionary linker 4 passes the first word ("we") of this document to the dictionary entry extractor ("we") of this document to the dictionary entry extractor

The overall operation of the third embodiment will be described next, focusing on the operations that occur when the user retrieves the "Global Slogan" document shown in FIG. 14 and selects the dictionary mode button on this document with the pointing device. Other operations are carried out as described in the first embodiment, it will be assumed that the dictionary entry store 9 is initially empty. It will also be assumed that the electronic dictionary 10 contains entries for all words in electronic dictionary 10 contains entries for all words in the "Global Slogan" document except the word "vast."

intermediate steps 401 and 402.

increasing the number of dictionaries that can be dictionaries can be used in their existing form, greatly have embedded tags. Commercially available electronic ever, is that the electronic dictionary 10 does not have to

embodiment that does not create an unknown-word file FIGs. 28 to 30 illustrate a variation of the third

in FIG. 26. Steps 400, 401, 402, and 403 are the same ary entry store 9. Step 406 replaces steps 404 and 405 nates processing without creating any file in the diction-8 sets an unknown-word flag (step 406), then termiunknown word in step 401, the dictionary entry extractor Referring to FIG. 28, upon encountering an in the dictionary entry store 9.

FIG. 30 shows the result file output by the dictionary although this is not explicitly shown in FIGs. 28 and 29. linker 4 activates the dictionary entry extractor 8, unknown-word flag is cleared each time the dictionary identical to the corresponding steps in FIG. 24. The and 506, as in FIG. 24. The other steps in FIG. 29 are not set, the dictionary linker 4 executes both steps 511 file without attached tags. If the unknown-word flag is linker 4 skips step 511, and writes the word in the result 512). If the unknown-word flag is set, the dictionary tionary linker 4 checks the unknown-word flag (step by the dictionary entry extractor 8 in step 510, the dic-Referring to FIG. 29, after having a word processed

file are the same as in FIG. 25, but the word "vast" ary 10. The first three lines and the fifth line in this result the word "vast" does not appear in the electronic dictionthe dictionary mode button is selected in FIG. 14 and linker 4 in this variation of the third embodiment when

warning the user in advance that the word cannot be the first embodiment, this variation has the advantage of which the word "vast" is not underlined. As explained in device 1, the user sees the display shown in FIG. 17, in When this result file is transferred to the client appears by itself on the fourth line.

Fourth Embodiment

looked up.

as in FIG. 26.

2, and does not communicate with the dictionary linker communicates directly with the linked document server tionary entry store. The dictionary entry extractor 8 linker 4, and dictionary entry extractor 8, but has no dicgenerally similar linked document server 2, dictionary electronic dictionary 10 as the third embodiment, and a 45 same client device 1, electronic document store 3, and Referring to FIG. 31, the fourth embodiment has the

determines whether the received information is a comdevice 1 in step 200, the linked document server 2 first accordingly. After receiving information from the client up commands. The command processing is modified mands: tag attachment commands and dictionary lookin the fourth embodiment can receive two types of com-Referring to FIG. 32, the linked document server 2

in the result file.

ent device 1 then displays the screen in FIG. 27, showstore 9, and sends this file to the dient device 1. The clinamed "/dic/keep/storehouse" from the dictionary entry server 2. The linked document server 2 retrieves the file text tag preceding this word to the linked document "\dic/keep/storehouse" contained in the invisible hyperthe client device 1 sends the file descriptor selects the word "storehouses" with the pointing device, user sees the screen shown in FIG. 15. If the user document server 2, then to the dient device 1, and the is transferred from the dictionary linker 4 to the linked When all words have been processed, the result file

".ezuodatora" to agningem esenaged and gni

dictionary. informing the user that the selected word is not in the which now displays the screen shown in FIG. 18, entry store 9, and sends this file to the client device 1, named "/dic/keep/unknown_words" from the dictionary server 2. The linked document server 2 retrieves the file "\dic/keep/unknown_words" to the linked document "vast," the dient device 1 sends the file descriptor shown in FIG. 15. If the user next selects the word in FIG. 27, the dient device 1 again displays the screen If the user selects the "Back" button on the screen

ate like the tirst embodiment, except that when the user To the user, the third embodiment appears to oper-

In terms of speed and efficiency, the third embodiment could also be adapted to operate in this way. tracted by definitions of other words. The first embodiquickly read the desired definition without being disthe user is shown only what he want to see, and can server 2 to the client device 1. Another advantage is that mation has to be transferred from the linked document screen at a time. One advantage of this is that less inforlooks up words, only one definition appears on the

has to create a result file each time. document server 2, because the dictionary linker 4 still quent times, but not as quickly as in the linked ary look-up is necessary the second time and subsethan in the first embodiment, because no actual dictionthe result file is returned to the client device I faster mode is selected repeatedly for the same document, second embodiments. When the dictionary-access ment is generally intermediate between the first and

grow very large if result files for many documents are ready document store 6 in the second embodiment can electronic dictionary 10, whereas the dictionary-accessent to exis ent yd betimil ai tnemibodme brint ent ni e efficiency, because the size of the dictionary entry store improve on the second embodiment in terms of memory entry store 9. The electronic document store 3 may also common words will already be stored in the dictionary in the second and subsequent documents, because embodiment may outperform the second embodiment series of different documents, however, the third If the dictionary-access mode is selected for a

The main advantage of the third embodiment, how-

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tions that take place when the dictionary mode button is selected in FIG. 14.

Selection of the dictionary mode button sends the same tay attachment command to the linked document server 2 as in the preceding embodiments. The linker document server 2 activates the dictionary linker 4, which quickly generates a result file by attaching dictionary look-up command tags to all of the words in the document, as illustrated in FIG. 34. This result file is displayed at the client device 1 as shown in FIG. 15, all words being underlined to indicate the presence of hypertext links.

If the user now selects the word "storehouses," for example, the client device 1 sends the linked document server 2 the attached dictionary look-up command "/cgibinypic_dic?storehouse." The linked document server 2 entry extractor 8, passing the word "storehouse" to the dictionary entry extractor 8 looks up the word "storehouse" to the dictionary entry extractor 8 looks up the word "storehouse" in any entry extractor 8 looks up the word "storehouse" in the electronic dictionary 10 and returns the dictionary entry extractor 8 looks up the word "storehouse" in the electronic dictionary 10 and returns the dictionary entry for this word, which is transferred to the client device 1 and displayed as in FIG. 27.

If the user selects a word such as "vast" which is not defined in the electronic dictionary 10, the dictionary entry extractor 8 creates a message such as "vast wa jisho ni arimasen," in which "vast" is the undefined word, and "wa jisho ni arimasen," are Japanese words meaning "is not in the dictionary." This message is returned to the linked document server 2, transferred to the client device 1, and displayed.

To the user, the fourth embodiment appears to operate much like the third embodiment, with the slight difference that the unknown-word message names the word that could not be found in the dictionary. In terms quickly trian in the third embodiment, because no dictionary took-up is required. When the user selects a word in this display, however, the detinition (or unknownword in this display, however, the detinition (or unknownword in this display, however, the detinition (or unknownmord in the third embodiment is advantageous for ment, while the fourth embodiment is advantageous for users who look up a large number of words in a longer document.

From the system's point of view, the fourth embodiment has the advantage of requiring less memory, because there is no dictionary entry store, and the further advantage that no time is spent in extracting words that the user will not select for dictionary look-up. When the same word is looked up repeatedly, however, the dictionary entry extractor 8 must be activated each time, instead of only once as in the third embodiment.

Fifth Embodiment

The fifth embodiment combines the advantages of the third and fourth embodiments.

mand (step 208). If the received information is not a command, the linked document server 2 proceeds with the processing already described in the first embodinent (steps 202, 204, 205, and 206). If the received information is a command, the linked document server 2 proceeds to step 201 to decide whether the command is a tag attachment command.

If the command is a tag attachment command, the linked document server 2 proceeds as described in the first embodiment (steps 203 and 207). If the command is not a tag attachment command, then the command is a dictionary look-up command, which the linked document server 2 processes by activating the dictionary ment server 2 processes by activating the dictionary entry extractor 8 (step 209).

and the processing of the dictionary linker 4 ends. file is output to the linked document server 2 (step 508) to all words in the document, at which point the result dictionary look-up command tags have been attached the result file (step 506). This process continues until look-up command tag and dosing tag are then written in ceding embodiments. The word and attached dictionary hypertext reference tags that were attached in the premand tag and a dosing tag (step 514), in place of the tionary linker 4 now attaches a dictionary look-up comunprocessed word found in step 503, however, the dicthird embodiments (steps 500, 501, and 502). For each and performs a morphemic analysis as in the first and a copy of the relevant document file, creates a result file, linked document server 2, the dictionary linker 4 obtains Referring to FIG. 33, upon being activated by the

FIG. 34 shows an example of the result file output by the dictionary linker 4 in the fourth embodiment for the "Global Slogan" document in FIG. 14. Each dictionary look-up command begins with "/cgi-bin/pic_dic?" The question mark is followed by the word to be looked up, e.g. "we" in the first line in FIG. 34. When the command is executed, the dictionary entry extractor 8 is activated as a command processor, and the word following the question mark is passed to the dictionary entry extractor 8 as a parameter.

ate a temporary file to hold the dictionary entry or this processing, the dictionary entry extractor 8 may crelar word is not found in the dictionary. In the course of example, a Japanese sentence stating that the particu-The content of the unknown-word message is, for message to the linked document server 2 (step 409). unknown-word message (step 410), and outputs this tionary, the dictionary entry extractor 8 prepares an document server 2. If the word is not defined in the dicthe word (step 408), then outputs the entry to the linked entry extractor 8 extracts the entire dictionary entry for defined in the electronic dictionary 10, the dictionary electronic dictionary 10 (step 401). If this word is ary entry extractor 8 looks up the supplied word in the dictionary entry extractor 8. Upon activation, the diction-FIG. 35 shows the processing carried out by the

unknown-word message.

Next, the overall operation of the fourth embodiment will be described, again focusing on the opera-

third and fourth embodiments. stored. The meanings of the tags are the same as in the words "draw," "vast," and "storehouses" have not been dictionary entry store 9, and dictionary entries for the the words "we" and "non" have already been stored in the draw on vast storehouses..." when dictionary entries for

embodiment (step 410), and outputs this message to creates an unknown-word message as in the fourth the word is not defined, the dictionary entry extractor 8 the entry to the linked document server 2 (step 409). If 9, as in the third embodiment (step 402), then outputs a copy of this entry as a file in the dictionary entry store of the word from the electronic dictionary 10 and stores dictionary entry extractor 8 extracts the dictionary entry tionary 10 (step 401). If the word is defined, the mining whether the word is defined in the electronic dicextractor 8 begins as in the fourth embodiment by deterparameter. Referring to FIG. 39, the dictionary entry ary entry extractor 8 receives a word as a command up command. As in the fourth embodiment, the dictionthe linked document server 2 receives a dictionary look-The dictionary entry extractor 8 is activated when

tionary 5 can be understood from the description given The overall operation of the tagged electronic dicthe linked document server 2 (step 409).

next time the definition of the word is requested. be looked up in the electronic dictionary 10 again the third embodiment, so that the same word will not have to saved in the dictionary entry store 9, however, as in the the tourth embodiment. The dictionary entries are when their meanings are requested by the user, as in are looked up in the electronic dictionary 10 one by one, without performing any actual dictionary look-up. Words ton, the dictionary linker 4 generates a result file, ments. When the user selects the dictionary mode butabove and the descriptions of the preceding embodi-

ary entry store 9 before generating each pair of tags. because the dictionary linker 4 must check the dictionnot as fast as in the fourth embodiment, however, the dictionary entry store 9. Output of the result file is entries are copied from the electronic dictionary 10 to tronic dictionary 10 is not accessed and no dictionary quickly than in the third embodiment, because the elec-The result file in the fifth embodiment is output more

a dictionary look-up command must be executed. returned as quiddy as in the third embodiment, because speed as the fourth embodiment. The definition is not the tith embodiment treturns the definition at the same The first time the definition of a word is requested,

and faster than in the fourth embodiment. is returned just as quickly as in the third embodiment, cuting a dictionary look-up command, so the definition definition from the dictionary entry store 9, without exerepeatedly, however, the fifth embodiment retrieves the When the definition of the same word is requested

in the electronic dictionary 10 unnecessarily, the same fourth embodiments, in that words are never looked up embodiment has advantages over both the third and From the point of view of system efficiency, the fifth

> tionary entry store 9. linker 4, and the dictionary linker 4 can access the diclinked document server 2 instead of with the dictionary dictionary entry extractor 8 communicates with the elements differ from the third embodiment in that the tionary entry store 9. The interrelations among these dictionary linker 4, dictionary entry extractor 8, and diciment, and a generally similar linked document server 2, store 3, and lectronic dictionary 10 as the third embodprises the same client device 1, electronic document Referring to FIG. 36, the fifth embodiment com-

> the preceding embodiments, so further description will server 2 in the titth embodiment can be understood from extractor 8. These operations of the linked document obtain dictionary entries from the dictionary entry to commands received from the client device 1, and can ary linker 4 and dictionary entry extractor 8 in response linked document server 2 can activate both the dictionto the client device 1. As in the fourth embodiment, the entries from the dictionary entry store 9, and send these result files from the dictionary linker 4 and dictionary ment, the linked document server 2 can also obtain electronic document store 3. As in the third embodidevice 1 and sends back documents retrieved from the document server 2 receives information from the client As in all of the preceding embodiments, the linked

processing of each word differs from the processing in same as in the third and fourth embodiments, but the These steps (steps 500, 501, 502, 503, and 508) are the the result file when all words have been processed. the words in the document file one by one, and outputs result file, performs a morphemic analysis, processes obtains a copy of the relevant document file, creates a mand. Referring to FIG. 37, the dictionary linker 4 document server 2 receives a tag attachment com-The dictionary linker 4 is activated when the linked be omitted.

when steps 516 and 111 are followed resemble the lines result file (step 506). The lines written in the result file (112 qats), and writes the word and these tags in the dictionary entry stored in the dictionary entry store 9 dictionary linker 4 generates tags linking the word to the word is already stored in the dictionary entry store 9, the entry store 9 (step 516). If the dictionary entry of that entry for that word is already stored in the dictionary the dictionary linker 4 first decides whether a dictionary When an unprocessed word is found in step 503, those embodiments.

are followed resemble the lines written in the fourth LTS bas 312 septs nerw elit file when steps 514 ni nettirw senil up tag and a closing tag in the result file (step 506). The (step 514), and writes the word with this dictionary looklinker 4 generates a dictionary look-up command tag stored in the dictionary entry store 9, the dictionary If the dictionary entry of the word is not already written in the third embodiment, shown in FIG. 25.

by the dictionary linker 4 for a document beginning "We FIG. 38 shows an example of the result file output embodiment, shown in FIG. 34.

in the dictionary entry store 9 for possible futures use. the linked document server 2, and also stores this entry electronic dictionary 10, returns the obtained entry to dictionary entry extractor 8 obtains this entry from the already been stored in the dictionary entry store 9, the device 1. If the dictionary entry for "storehouse" has not linked document server 2, which sends it to the client entry extractor 8 quickly returns the stored entry to the stored in the dictionary entry store 9, the dictionary

dictionary entry. in the dictionary, and returns this message instead of a oreates a message stating that the selected word is not electronic dictionary 10, the dictionary entry extractor 8 If the user selects a word that is not defined in the

embodiment is faster than the third and fifth embodinthe electronic dictionary 10. In this regard, the sixth without accessing either the dictionary entry store 9 or quickly, because the dictionary linker 4 attaches tags tage as the fourth embodiment in returning a result file The sixth embodiment thus has the same advan-

The sixth embodiment resembles the fifth embodiiment does not require command execution in this case. slower than the fifth embodiment, since the fifth embodbeen looked up before, the sixth embodiment is also slower than the fifth embodiment. When the word has dictionary 10. In both cases, the sixth embodiment is entry store 9 after being obtained from the electronic the electronic dictionary 10, and stored in the dictionary the dictionary entry store 9 before being obtained from because the dictionary entry must be searched for in embodiment it the word.has not been looked up before, electronic dictionary 10, but slower than the fourth obtained from the dictionary entry store 9 instead of the looked up before, because the dictionary entry can be faster than the fourth embodiment if the word has been dictionary-access-ready document store 6 is generally In returning the definitions of individual words, the

tionary entries that no one wants to see. user, thereby avoiding the unnecessary storage of dictionary entry store 9 until specifically requested by the ment in that dictionary entries are not stored in the dic-

Seventh Embodiment

tion to hypertext documents, as well as to other docuembodiments by attaching dictionary access informa-The seventh embodiment differs from the preceding

electronic dictionary 15, and a menu generator 16. linked document server 2 and dictionary linker 4, an store 3 as the first embodiment, a generally similar prises the same client device 1 and electronic document Referring to FIG. 42, the seventh embodiment com-

ment. When the linked document server 2 issues a dicthe dictionary entry extractor 8 in the fourth emboditogether with dictionary access software equivalent to ple, a commercially available electronic dictionary, The electr nic dictionary 15 comprises, for exam-

> ary entry store 9. wants to see are not stored unnecessarily in the dictionmore than once, and dictionary entries that no one word is not looked up in the electronic dictionary 10

Sixth Embodiment

The sixth embodiment also combines the advan-

tages of the third and fourth embodiments.

generally similar to the corresponding elements in the ment server 2 and dictionary entry extractor 8 that are linker 4 as the fourth embodiment, and a linked docuary 10 as the third embodiment, the same dictionary store 3, dictionary entry store 9, and electronic dictionprises the same client device 1, electronic document Referring to FIG. 40, the sixth embodiment com-

document server 2 in the sixth embodiment does not ment server 2 in the fifth embodiment is that the linked server 2 in the sixth embodiment and the linked docu-The only difference between the linked document fifth embodiment.

starts by checking whether a dictionary entry for the document server 2, the dictionary entry extractor 8 Referring to FIG. 41, when activated by the linked access the dictionary entry store 9 directly.

read to the linked document server 2 (step 409). store 9 (step 412), and outputs the dictionary entry thus 8 reads this dictionary entry from the dictionary entry ary entry is already stored, the didionary entry extractor responding step in the third embodiment. If the dictionentry store 9 (step 400). This step is identical to the corcommand parameter is already stored in the dictionary word supplied by the linked document server 2 as a

message to the linked document server 2 (step 409). 410), and output the dictionary entry or unknown-word (step 402) or create an unknown-word message (step tionary entry (if found) to the dictionary entry store 9 in the electronic dictionary 10 (step 401), copy its dicproceeds as in the fifth embodiment to look up the word dictionary entry store 9, the dictionary entry extractor 8 If the dictionary entry is not already stored in the

sending a tag attachment command to the linked docuthe user selects the dictionary mode button, thereby will be briefly described, starting from the point at which Next the overall operation of the sixth embodiment

device 1 and displayed as in FIG. 15. one shown in FIG. 34. This tile is sent to the client to the flowchart in FIG. 33, producing a result file like the embodiment. The dictionary linker 4 operates according mand tags to all words in the document, as in the fourth ary linker 4, which attaches dictionary look-up com-The linked document server 2 activates the dictionment server z.

dictionary entry for "storehouse" has already been extractor 8 according to the flowchart in FIG. 41. If the ment server 2 and executed by the dictionary entry "cgi-bin/pick_dic?storehouse" is sent to the linked docu-"storehouses" on the display in FIG. 15, the command If the user now selects, for example, the word

09

01

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acter string is a word, the dictionary linker 4 generates a dictionary look-up command tag for the character string "Corporate," the (step 520). For the character string "Corporate," the generated tag is, for example, (A HREF = "/cgi-bin/look_up?corporate"). In this tag, "/cgi-bin/look_up" software in the electronic dictionary 15, and "corporate" is the word to be looked up, which is passed to the electronic dictionary 15 as a command parameter. The electronic dictionary 15 as a command parameter. The dictionary linker 4 also generates a closing tag (VA)). Next, the dictionary linker 4 also generates a closing tag (VA). Next, word "Corporate" in the example above) as having been processed (step 521), and writes the generated tags and the character string in the result file (step 506).

If the character string is a tag, giving an affirmative result in step 519, the dictionary linker 4 proceeds to determine whether the tag is a link tag, that is, an opening tag specifying a hypertext reference to another document (step 522). If the tag is not a link tag, the dictionary linker 4 simply flags the tag character string as having been processed (step 521) and writes the tag character string in the result file (step 506). If the tag is a link tag, however, the dictionary linker 4 activates the tag in menu generator 16 (step 523), then writes the information returned by the menu generator 15 in the result file fion returned by the menu generator 15 in the result file

When activated by the dictionary linker 4, the menu generator 16 receives a pointer to the opening tag found by the dictionary linker 4 to be a link tag. Referring to FIG. 45, the menu generator 16 begins by generating a menu-opening command tag that makes the hypertext reference specified in the link tag into the default menu selection, and specifies dictionary look-up for the other selection, and specifies dictionary look-up for the other selections (step 600). An example will be shown later. The menu generator 16 writes the menu-opening command tag into a temporary tile that will be passed back to the dictionary linker 4, then flags the opening tag as

tor 16 returns to step 602 to process the next character processed (step 605). After step 605, the menu genera-(step 606) and flags the character string as having been linker 4 writes the character string into the temporary file (step 605). If the character string is a tag, the dictionary flags the character string as having been processed passed back to the dictionary linker 4 (step 604), and ter string as an option line in the temporary file to be in a buffer, also writes the dictionary form of the characword, the menu generator 16 stores the character string acter string is not a tag, i.e. if the character string is a character string is any type of tag (step 603). If the charing tag, the menu generator 16 determines whether the the link (step 602). If the character string is not the closmines whether this character string is the closing tag of character string following the opening tag, and deter-The menu generator 16 then examines the next having been processed (step 601).

When the closing tag is encountered in step 602, the menu generator 16 flags this tag as having been processed (step 607), then writes the contents of the

tionary look-up command and supplies a word as a command parameter, the electronic dictionary 15 returns the dictionary entry for the supplied word A single dictionary entry can be returned, as illustrated in FIG. 27, or the electronic dictionary 15 can return dictionary entries for the supplied word and several alphabetically adjacent words, as illustrated in FIG. 16. If the supplied word is not defined in the electronic dictionary 15, the electronic dictionary 15 returns a message to that effect.

The linked document server 2 operates as shown in FIG. 43. Upon receiving information from the client device 1 (step 200), the linked document server 2 determines whether the information is a command or a file descriptor (step 208). If the information is a file described tor, the linked document server 2 gets the described document file from the electronic document store 3 (step 202), attaches a dictionary mode button (step 205), and sends the document back to the client device 7. Differing from the linked document server 2 in the previous embodiments, the linked document server 2 in the the seventh embodiment attaches a "Dictionary mode" tag even if the document is a hypertext document, contaging links to other documents.

If the information received from the client device 1 is a command, the linked document server 2 determines whether the command is a tag attachment command, or mand is a tag attachment command, the linked document server 2 activates the dictionary linker 4 (step 203), then receives the result file output by the dictionary linker 4, adds an ordinary mode button to the result aty linker 4, adds an ordinary mode button to the result device 1 (step 207), and sends the result tile (step 207), and sends the result tile (step 207).

If the command is a dictionary look-up command, the linked document server 2 executes the command, thereby activating the software that looks up words in the electronic dictionary 15, and obtaining the contents of a dictionary entry, or an unknown-word message, from the electronic dictionary 15 (step 210). The infortion obtained from the electronic dictionary 15 is then reaction obtained from the electronic dictionary 15 is then sent as a document to the client device 1 (step 206).

When activated by the linked document server 2, the dictionary linker 4 operates as shown in FIG. 44. After obtaining the relevant document file from the result file (step 501), the dictionary linker 4 performs a morphemic analysis (step 502). If the document is a hypertext document, the morphemic analysis identifies both character strings that represent words and character strings that represent age in the document. These character strings are then processed one by one until cone are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained in step none are left (until a negative result is obtained and negat

When an affirmative result is obtained in step 518, indicating the presence of an unprocessed character string in the document, the next step is to determine whether the character string is a word or a tag (step 519). If the character string is not a tag, i.e. if the character string is not a tag and it is not a

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09

"message."

play in FIG. 47.

of "storehouse."

These lines are followed by a VSELECT) tag, which

The linked document server 2 adds an ordinary Slogan" and "OKI Electric at a Glance."

If the user selects the word "Corporate" with the Glance" are presented as buttons that call forth menus. President," "Global Slogan," and "OK! Electric at a up in the dictionary. The three items "Message from the and "Guidance" indicate that these words can be looked FIG. 49. The underlines under the words "Corporate" device 1 displays the received document as shown in the resulting document to the dient device 1. The dient giving "guidance" as a hypertext reference, and sends 25 anil listini na gnibba yd alil tinear airlt ot nottud abom

and executes the command "/cgi-bin/look_up?corpopointing device, the linked document server 2 receives

As a variation of the seventh embodiment, menu-

hypertext documents as well as from other documents,

embodiment is able to provide dictionary access from

menus as described above, however, the seventh

ary entries and result file are not stored. By using

tionary mode button is selected, and in that the diction-

when specifically requested, instead of when the dic-

embodiment in that dictionary entries are looked up

device 1. The user then sees the Japanese definition of

ary 15, and sends this dictionary entry back to the client

tionary entry for "message" from the electronic diction-

command, the linked document server 2 obtains the dic-

bin/look_dic?message" command. By executing this

and sends to the linked document server 2 a "/cgi-

"message" as an argument. This function generates

the Tookdic" function shown in FIG. 48 with the word

this menu item is selected, the client device 1 executes

change the menu selection as shown in FIG. 51. When

the word "message," he can use the pointing device to

had selected "Message from the President" on the dis-

user will be able to read a presidential message, as if he

which will return the corresponding document, and the

"message" will be sent to the linked document server 2,

on the pointing device, for example, the file descriptor

If the user chooses this selection, by pressing a button

is highlighted to indicate that this is the default selection.

The top line "Message from the President" in this menu

menu beside the selected button, as shown in FIG. 50.

shown in FIG. 48 cause the dient device 1 to display a

dent" button, however, the tags and other intormation

definition of "corporate" is given instead of the definition

play similar to FIG. 16 or 27, except that the Japanese

dictionary entry for this word. The user then sees a dis-

rate," causing the electronic dictionary 15 to return the

If the user selects the "Message from the Presi-

If the user wants to know the Japanese meaning of

The seventh embodiment is similar to the fourth

which is a considerable benefit for the user.

The result file continues with similar menus for "Global is a closing tag indicating the end of the "select" menu.

dictionary entry of the given word.

notation "(dic)," indicating that this option selects the each preceded by an (OPTION) tag and followed by the the words "Message," "from," "the," and "President," menu generator 16, comprising the dictionary forms of The next four lines are option lines written by the

argument of the function. cates that a selected option is to be supplied as an cuted by the client device 1, and the word "option" indidictionary 15. Specifically, "lookdic" is a function exeselected by the user is to be looked up in the electronic selection from the default selection, the menu option dic(option)" indicates that if the user changes the menu tor "message." The following "onChange = 100Khypertext reference to a document with the file descripsage)" indicates that the default menu selection is a and so on can be assigned. Next, "onFocus = 'ref(mes-"select1." Arbitrary names such as "select1," "select2," menu-opening tag. The name of the menu is given as The word SELECT identifies this command tag as a

- "message"). erated by the menu generator 16 from the tag (A HREF there then appears a menu-opening command tag genthe word "Guidance." After a pair of formatting tags, a closing tag (VA)). This is followed by a similar line for described above, followed by the word "Corporate" and the tag (A HREF = "/cgi-bin/look_up?corporate") The first line in the result file contents 34 comprises

tents 34 shown in FIG. 48. generator 16 together generate a result file with the conmenu generator 16. The dictionary linker 4 and menu vating the dictionary linker 4, which in turn activates the cutes the "/cgi-bin/into_the_dic" command, thereby acti-

FIG. 46, the linked document server 2 receives and exe-If the user selects the dictionary mode button in

Shown in FIG. 47. message. The client device 1 displays the document as descriptor "message" and containing a presidential a hypertext reference to a document having the file tags. For example, the link tag (A HREF = "message") is body of the document, including formatting tags and link mode," then a closing tag. The other lines contain the bin/into_the_dic" command, then the words "Dictionary prising an opening tag containing the "/cgithe line added by the linked document server 2, comdevice 1 in the form shown in FIG. 46. The first line 22 is button, and sends the resulting document to the client electronic document store 3, adds a dictionary mode server 2 obtains the "Corporate Guidance" file from the shown in FIG. 12, for example, the linked document When the user enters "guidance" on the screen

"guidance." descriptor of this document will be assumed to be the Guidance" hypertext document shown earlier. The file ment will be described in relation to the "Corporate Next, the overall operation of the seventh embodi-

rary file to the dictionary linker 4 (step 609). 608), adds a menu dosing tag, and passes the tempodescribing the default option, in the temporary file (step above-mentioned buffer as a selected-option line,

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ment in step 701, the document is passed without after-It the document is found not to be a hypertext docu-

ation to the dictionary linker 4 (step 706).

result file, the dictionary linker 4 passes the result file to words and writing the words and command tags in the extractor. After generating such command tags for all electronic dictionary 15, instead of the dictionary entry look-up command tags generated in step 514 invoke the linked document server 2 in step 500, and the dictionary ment file from the link remover 17 instead of from the linker 4 in the eighth embodiment receives the document and eighth embodiment are that the dictionary between the dictionary linkers 4 in the fourth embodilowing the flowchart in FIG. 33. The only differences operates essentially as in the fourth embodiment, folment from the link remover 17, the dictionary linker 4 Upon receiving a temporary file or unaltered docu-

Next, the overall operation of the eighth embodi-

the linked document server 2.

rate Guidance" hypertext document. ment will be described, again in relation to the "Corpo-

dictionary 15. indicate that the word can be looked up in the electronic the "Corporate Guidance" document is underlined to the display in FIG. 54, in which each individual word in and after the word "Message." As a result, the user sees bin/look_up?message") and (/A) are inserted before and after the word "Corporate," and (A HREF = "/cgibin/look_up?corporate") and (\A) are inserted before tags. For example, the tags (A HREF = "/cgiary linker 4 next inserts dictionary look-up command shown in FIG. 46 are removed, for example. The diction- $\langle A \rangle$ bns ("message") and the $\langle A \rangle$ document server 2 and removes the hypertext links. the "Corporate Guidance" document from the linked ary mode button, the link remover 17 obtains a copy of display shown in FIG. 47. If the user selects the dictionas in the seventh embodiment, and the user sees the document server 2 attaches a dictionary mode button When the user retrieves this document, the linked

pointing device. documents by selecting the underlined items with the in FIG. 47. From FIG. 47, the user can retrieve other select the ordinary mode button to return to the display necessary words have been looked up, the user can the display in FIG. 54 with the pointing device. When all The user can look up words by selecting them on

user cannot proceed directly from the display in FIG. 54 embodiment is less convenient, however, in that the going through a menu selection process. The eighth in that dictionary definitions can be obtained without embodiment is more convenient for the user to operate, Compared with the seventh embodiment, the eighth

to another linked document.

uments stored in the electronic document store 3. generator 16 is used to generate the menu-tagged docto all words in the document. In this variation, the menu ment to have dictionary look-up command tags added he can select the dictionary mode button on the docureaches a document he wants to read more thoroughly, documents are in a foreign language. When the user move from one hypertext document to another when the appearing in hypertext links. This feature helps users to user with quicker dictionary access to the words the electronic document store 3, thereby providing the FIG. 48 can be placed in the document files stored in opening tags and option tags like the ones shown in

Eighth Embodiment

dictionary-access mode. removing the hypertext links to other documents in the access from hypertext documents, but does so by The eighth embodiment also provides dictionary

ment server 2 and the dictionary linker 4. remover 17 communicates with both the linked docu-2 and dictionary linker 4, and a link remover 17. The link embodiment, a generally similar linked document server store 3, and electronic dictionary 15 as the seventh prises the same client device 1, electronic document Referring to FIG. 52, the eighth embodiment com-

dictionary linker 4 as in the seventh embodiment. linked document server 2 obtains a result file from the sequently activates the dictionary linker 4, and the activates the link remover 17. The link remover 17 subing the dictionary linker 4, the linked document server 2 receiving a tag attachment command, instead of activatseventh embodiment in the following regard: upon iment differs from the linked document server 2 in the The linked document server 2 in the eighth embod-

whether this document is a hypertext document (step (step 700). Next, the link remover 17 determines document file from the electronic document store 3 ing the linked document server 2 transfer the relevant which the tag attachment command was issued, by havlink remover 17 first obtains a copy of the document for the link remover 17 operates as shown in FIG. 53. The When activated by the linked document server 2,

processing returns to step 703. are written in the temporary file (step 705), after which processing returns to step 703. Other character strings character string constituting the tag is discarded, and another file (step 704). When such a tag is read, the that is the opening or dosing tag of a hypertext link to strings, the link remover 17 looks for a character string remain to be read (step 703). While reading character ument, continuing as long as any character strings starts reading character strings from the top of the docremover 17 opens a temporary file (step 702), then If the document is a hypertext document, the link

this way, the temporary file consists of the entire con-When all character strings have been processed in

(104

Ninth Embodiment

nouns, verbs, adjectives, and adverbs until these words continue attaching dictionary access information to after these words have been looked up once, but will to articles, conjunctions, pronouns, and prepositions linker 4 will stop attaching dictionary access information adjectives, and adverbs. In this case, the dictionary pronouns, and prepositions, and to ten for nouns, verbs, of N could be set equal to zero for articles, conjunctions, according to the part of speech. For example, the value non-negative integer. The threshold value M may vary looked up more than N times in the past, where N is a past, and is not attached to words that have been words that have been looked up at most N times in the threshold: dictionary access information is attached to decision can be made, for example, according to a tionary access information to the word (step 525). This access tabulator 18, and decides whether to attach dicpast, receives this information from the dictionary number of times the word has been looked up in the the dictionary access tabulator 18 to indicate the access tabulator 18 together with a command asking dictionary linker 4 sends the word to the dictionary indicating the presence of an unprocessed word, the When an affirmative result is obtained in step 503,

ess the next word. 506, the dictionary linker 4 returns to step 503 to procword is written in the result file in step 506. After step access information, step 520 is skipped, and only the dictionary linker 4 decides not to attach dictionary and these tags in the result file (step 506). When the sponding closing tag (step 520), and writes the word ates a dictionary look-up command tag and a correattach dictionary access information to a word, it gener-When the dictionary linker 4 decides in step 525 to

have been looked up eleven times.

and 60. tor 18 will be described with reference to FIGs. 58, 59, Next, the operation of the dictionary access tabula-

"draw" three times. has been looked up once, for example, and the word count. The table in FIG. 58 indicates that the word "we" This number of times will be referred to as the look-up received a dictionary look-up command for the word. number of times the linked document server 2 has tor 18 from the linked document server 2; that is, the the word has been sent to the dictionary access tabula-Each record comprises a word and the number of times table of word look-up records as illustrated in FIG. 58. The dictionary access tabulator 18 maintains a

access tabulator 18 creates a new record in the table of plied word does not already appear, the dictionary increments its look-count by one (step 801). If the supalready appears, the dictionary access tabulator 18 word look-up counts (step 800). If the supplied word ing a word that does not already appear in the table of 18 determines whether the word is a new word, meanshown in FIG. 59. First, the dictionary access tabulator server 2, the dictionary access tabulator 18 operates as When supplied with a word by the linked document

> words. document, instead of attaching such information to all information only to selected words in a non-hypertext The ninth embodiment attaches dictionary access

> dictionary linker 4. server 2, and supplies this information on request to the obtaining this information from the linked document dictionary definitions of different words are requested, tor 18 keeps records indicating the frequency with which 2 and dictionary linker 4. The dictionary access tabulalator 18, which is coupled to the linked document server 2 and dictionary linker 4, and a dictionary access tabuembodiment, a generally similar linked document server store 3, and electronic dictionary 15 as the eighth prises the same client device 1, electronic document Referring to FIG. 55, the ninth embodiment com-

The linked document server 2 in the ninth embodiseparate dictionary access tabulator 18 is unnecessary. be built into the electronic dictionary 15, in which case a functions of the dictionary access tabulator 18 may also they may reside in two or more separate systems. The same computer system or workstation, for example, or and dictionary access tabulator 18 may all reside in the The linked document server 2, dictionary linker 4,

the fourth embodiment, shown in FIG. 32. ing steps performed by the linked document server 2 in and 207). These steps are identical to the correspondput by the dictionary linker 4 (steps 200, 208, 201, 203, attaches an ordinary mode button to the result file outcommand, it activates the dictionary linker 4, and linked document server 2 receives a tag attachment ment (steps 200, 208, 202, 204, and 205). When the mode button if the document is not a hypertext docuthe requested document and attaches a dictionary document server 2 receives a file descriptor, it obtains ment operates as shown in FIG. 56. When the linked

access tabulator 18 (step 211). ument server 2 passes the word to the dictionary word is not in the dictionary. In addition, the linked doctronic dictionary 15, or an unknown-word message if the dictionary entry for the requested word from the elec-(step 210) as in the eighth embodiment, obtaining the tionary look-up command, it executes the command When the linked document server 2 receives a dic-

(Step 206). obtained from the above processing to the client device server 2 sends the document or dictionary entry After step 205, 207, or 211, the linked document

linked document server 2 (step 508). tive result in step 503), then outputs the result file to the one until no unprocessed words remain (giving a nega-502), the dictionary linker 4 processes words one by (step 501), and performing a morphemic analysis (step document to be tagged (step 500), creating a result file in the first embodiment, after obtaining a copy of the the dictionary linker 4 operates as shown in FIG. 57. As When activated by the linked document server 2,

linker 4 (step 806). 18 returns a look-up count of zero to the dictionary word does not appear, the dictionary access tabulator look-up count to the dictionary linker 4 (step 805). If the appears, the dictionary access tabulator 18 returns its word look-up counts (step 804). If the supplied word determines whether the word appears in the table of in FIG. 60. First, the dictionary access tabulator 18 4, the dictionary access tabulator 18 operates as shown When supplied with a word by the dictionary linker

will be described. Next, the overall operation of the ninth embodiment

document is not a hypertext document). dictionary mode button, because the "Global Slogan" hypertext document), then the display in FIG. 14 (with a because the "Corporate Guidance" document is a play in FIG. 13 (without a dictionary mode button, the "Global Slogan" document, he will see first the dis-Guidance" document, then selects the hypertext link to the user enters the file descriptor of the "Corporate Starting from the initial screen shown in FIG. 12, if

file back to the client device 1. server 2 adds an ordinary mode button, and sends this dictionary access tabulator 18. The linked document file according to the look-up counts maintained by the vates the dictionary linker 4, which generates a result display in FIG. 14, the linked document server 2 acti-If the user selects the dictionary mode button on the

the threshold value (ten) for verbs. Other lines are genthe look-up count (three) for this word does not exceed tionary look-up command tag and closing tag, because next line contains the word "draw" together with a dicexceeds the threshold value (zero) for pronouns. The "We," because the look-up count (one) for this word ument server 2. The next line contains only the word 61 is the ordinary mode button added by the linked docten are used as described above. The first line in FIG. shown in FIG. 58, and the threshold values of zero and when the word look-up count table has the contents by the linked document server 2 to the client device 1 FIG. 61 shows an example of the result file returned

nition will be returned and the display in FIG. 62 will 27. If the user selects the word "We," however, no defiwill obtain a Japanese definition as shown in FIG. 16 or user selects the word "storehouses," for example, he FIG. 62 by selecting them with the pointing device. If the The user can now look up the underlined words in device 1 displays this result file as shown in FIG. 62. erated similarly by the dictionary linker 4. The client

attached to this word. remain unchanged, because no dictionary access tag is

processing that must be carried out by the dictionary more and more words, the amount of tag attachment these words. More significantly, as the user looks up reminds the user that he (presumably) already knows looked up a certain number of times, the system By not underlining words that the user has already

becomes faster. response to selection of the dictionary mode button linker 4 gradually decreases, and the system's

tive times in the color red. green, and words that have been looked up more than have been looked up from one to five times in the color before can be displayed in the color blue, words that word. For example, words that have not been looked up is displayed, depending on the look-up count of the also attaches tags that vary the way in which each word the document, regardless of their look-up counts, but attaches dictionary access information to all words in described. In this variation, the dictionary linker 4 Next, a variation of the ninth embodiment will be

mation that can help the user to decide which words to ing. The display colors thus provide the user with inforpast, suggesting that this might be a word worth learnword "vast" has been looked at least six times in the ilarly. In this case the color red informs the user that the ingly displayed in blue. Green and red are specified simdisplayed in the color blue. The word "We" is accordthis tag and the following closing tag VFONT) are to be BLUE \in the tirst line indicates that the words between by the dictionary linker 4 in this case. The tag (FONT = FIG. 63 shows a hypothetical result file generated

italic and bold fonts can be used. of the underlines below the words can be altered, or up counts in various other ways. For example, the colors are displayed, the dictionary linker 4 can indicate look-Instead of changing the colors in which the words

Tenth Embodiment

look nb.

been frequently tagged but rarely looked up. been looked up, and stops tagging words that have dictionary access and the number of times the word has tack of both the number of times a word is tagged for the ninth embodiment. The tenth embodiment keeps The tenth embodiment adds a learning function to

culator 20, which is linked to the dictionary linker 4, dicwhich is linked to the dictionary linker 4, and a ratio caltenth embodiment also comprises a tag tabulator 19, iment, and a generally similar dictionary linker 4. The and dictionary access tabulator 18 as the ninth embod-2, electronic document store 3, electronic dictionary 15, prises the same client device 1, linked document server Referring to FIG. 64, the tenth embodiment com-

The tag count indicates the number of times the word, count supplied from the dictionary access tabulator 18. tor 20 (step 527), instead of on the basis of a look-up count and look-up ratio supplied from the ratio calculaaccess information to ach word on the basis of a tag embodiment decides whether to attach dictionary difference is that the dictionary linker 4 in the tenth ment, but with two differences. Referring to FIG. 65, one operates like the dictionary linker 4 in the ninth embodi-The dictionary linker 4 in the tenth embodiment tionary access tabulator 18, and tag tabulator 19.

ratio is one.

repeatedly in the same place in the same document, the tagged, which may occur if a user looks up a word It the word has been looked up more often than

The overall operation of the tenth embodiment is linker 4 (step 904). the tag count and the look-up ratio to the dictionary step 902 or step 903, the ratio calculator 20 sends both also set to one if the tag count is zero (step 903). After look-up ratio is arbitrarily set to one. The look-up ratio is

similar to the overall operation of the ninth embodiment,

ging the word, as soon as the tag count exceeds the first the meaning of the word, the system will again stop tagstops looking it up, presumably because he has learned old value. If the user looks the word up a few times, then the word as soon as its tag count passes the first threshalready knows the word, the system will stop tagging is tagged repeatedly, presumably because the user the user does not look up a word even though the word but more responsive to the user's look-up behavior. If

As a variation of the tenth embodiment, the dictionthe second threshold value. tag the word as long as the look-up ratio remains above from time to time, however, the system will continue to threshold value. If the user keeps looking the word up threshold value and the look-up ratio falls to the second

Alternatively, the tenth embodiment can be adapted meaning of the word and would like to look it up again. nitely, even if in the meantime the user forgets the likely to continue deciding not to tag that word indetitionary linker 4 decides not to tag a given word, it is so is that if the tables are not cleared, then once the dicizing both tables to an empty state. The reason for doing tionary access tag counts periodically, thereby re-initialadapted to clear the tables of look-up counts and dicary access tabulator 18 and tag tabulator 19 can be

ened. counts are cleared or adjusted can be gradually lengthword up, the intervals at which the look-up and tag appears in a document. If the user still does not look the value, so that the word can be tagged again when it the look-up ratio greater than the second threshold to zero, or to adjust the tag count to a value that makes that have not been looked up for a certain period of time to clear the look-up and tag counts of individual words

look-up ratios, or otherwise alter the display of the play tagged words in different colors according to their The tenth embodiment can also be adapted to dis-

is practiced in a system that serves multiple users, the When the ninth embodiment or tenth embodiment described above. up, as in the variation of the ninth embodiment words to indicate how frequently they have been looked

mented in systems that require a user to present a user ior of other users. This feature can easily be impleone user will not be affected by the past look-up behavthat the words made available for dictionary look-up by be adapted to maintain separate tables for each user, so dictionary access tabulator 18 and tag tabulator 19 can

tagged five times and looked up five times, its look-up looked up, its look-up ratio is zero. If the word has been ple, if a word has been tagged five times and never is a number between zero and one, inclusive. For examto obtain the look-up ratio (step 902). The look-up ratio 901). The look-up count is then divided by the tag count 18 and receives the look-up count of the word (step for 20 sends the word to the dictionary access tabulator (step 900). If the tag count is not zero, the ratio calculathe word, and deciding whether the tag count is zero word to the tag tabulator 19, receiving the tag count of linker 4. The ratio calculator 20 begins by sending this tor 20 when supplied with a word from the dictionary FIG. 66 illustrates the operation of the ratio calcula-

zero of the word does not appear. word appears in the table, and returns a tag count of tag tabulator 19 returns the tag count of the word if the appear. When sent a word by the ratio calculator 20, the record with a tag count of one if the word does not appears in the table, and enters the word in a new increments the tag count of the word if the word already 19 searches for the word in the table of tag counts, sent a word by the dictionary linker 4, the tag tabulator indicate tag counts instead of look-up counts. When look-up counts shown in FIG. 58, except that the values tion to different words. The table is similar to the table of tionary linker 4 has attached dictionary access informaa table of records indicating the number of times the dicdrawings will be omitted. The tag tabulator 19 maintains described in the ninth embodiment, so explanatory to the operation of the dictionary access tabulator 18,

The operation of the tag tabulator 19 is analogous step-by-step description will be omitted. linker 4 in the ninth embodiment, shown in FIG. 57, so a the corresponding steps performed by the dictionary

The other steps shown in FIG. 65 are identical to

being tagged to the tag tabulator 19 (step 528). tionary linker 4 passes the dictionary form of the word after generating the necessary tags in step 520, the diclinker 4 decides to attach dictionary access information,

The other difference is that, when the dictionary looked up more than three-tenths of the time.

tagged more than five times already, but has not been tionary access information unless the word has been example, the dictionary linker 4 can decide to attach dicdecides not to attach dictionary access information. For than the second threshold value, the dictionary linker 4 threshold value and the look-up ratio is equal to or less information. If the tag count is greater than the first dictionary linker 4 decides to attach dictionary access 10 look-up ratio is greater than the second threshold, the equal to or less than the first threshold value, or the ratio with a second threshold value. If the tag count is tag count with a first threshold value and the look-up Specifically, the dictionary linker 4 compares the

the word by the user. portion of those times have resulted in actual look-up of tagged in the past. The look-up ratio indicates what proor a word with the same dictionary form, has been

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ble physical buttons, or they can be displayed as icons shown in the drawings, or they can be made to resemmode button can be displayed as underlined words, as the screen. The ordinary mode button and dictionary the "Forward" and "Back" and other buttons at the top of device 1 can be adapted to display these buttons beside linked document server 2. For example, the client in the drawings, and do not have to be added by the nworks anothized and in the positions shown The ordinary mode button and dictionary mode butgraphical dictionaries and other such dictionaries.

can return to the ordinary mode by selecting the "Back" The ordinary mode button can be omitted. The user or any other recognizable control items.

to be looked up regardless of the location from which retrieved from other sites, enabling words in a document can attach dictionary mode buttons to documents different sites. In this case, a linked document server ers, and multiple electronic document stores located at multiple client devices, multiple linked document servcomputer communication network in which there are As noted earlier, the invention can be practiced in a putton.

attribute information. text tags, but can be embedded in other forms, such as commands or pointers need not be contained in hyperlook-up commands or pointers to those files. These arbitrary text files to be looked up, by adding dictionary example, the invention can be used to enable words in not linked to one another by hypertext references. For is not networked, or a system in which documents are The invention can also be practiced in a system that the document is obtained.

can be given. inition, as shown in the drawings. The definition alone do not have to give both the accessed word and its def-The dictionary entries returned to the client device

together with the file descriptor of each document to be attachment command to the linked document server ple, the client device can be adapted to send a tag button each time he needs to look up a word. For examthe user does not have to select the dictionary mode automatically when a document is first retrieved, so that result file with embedded dictionary access information The invention can also be adapted to generate a

modifications are possible within the scope claimed Those skilled in the art will recognized that further retrieved.

below.

ment, comprising the steps of: such as character strings in the electronic docuuser on a device enabling the user to select items A method of displaying an electronic document to a

character strings in said electronic document; attaching dictionary access information to

> the system. name or other identifying information when accessing

other common words that everyone knows. ging of the English articles ("a," "an," and "the") and example, the system can quickly learn to omit the taggained from the look-up behavior of other users. For given user, the system can make use of information users. In this case, in deciding which words to tag for a single table of tag counts can be maintained for all Alternatively, a single table of look-up counts and a

ent dictionaries. colors to indicate to the user that the tags lead to differthe appropriate specialized dictionary, using different be adapted to tag specialized terminology for access to various specialized dictionaries, for example, and may these words are to be displayed. The system may have words are to be tagged for dictionary access, and how tain a table of conditions specifying how individual and tag counts. More generally, the system can mainnot to be tagged, in place of the tables of look-up counts play system can maintain a fixed list of words that are As a further variation, the invented document dis-

combinations are possible. third embodiments can be combined, and many other obtain new embodiments. For example, the second and features of different embodiments can be combined to the ways in which the invention can be practiced. The The embodiments described above do not exhaust

guage. Definitions of words can also be given in the words in any language can be given in any other lan-Japanese definitions of English words. Definitions of Needless to say, the invention is not limited to giving

same language as the words themselves.

meanings of words. also be used, in addition to dictionaries giving the for example, short biographies of famous people, may adapted to display such pictures. Dictionaries that give, tures, in which case the client device 1 should be put. Dictionary entries may also be illustrated with picdevice 1 should be equipped with facilities for audio outmeans of synthesized speech, in which case the client indicate the pronunciation of the word, possibly by and their definitions. The dictionary entries may also tion are not limited to dictionaries that simply give words The electronic dictionaries employed in the inven-

could be used to select a biographical dictionary. the document. Thus a tag indicating an author's name tionary on the basis of the contents of tags appearing in pressed. Another possible method is to select the dicdocument for which the dictionary mode button was selects the dictionary having the most key words in the assigns certain key words to each dictionary, and select a particular dictionary. One known method electronic dictionaries, various means can be used to When the invention is practiced using a plurality of

broadly enough to include the descriptions given in biotionary. The term "defined" should be interpreted referred to words as being defined in an electronic dic-The description of the present invention has

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dictionary (10). entry store (9) separate from said electronic

entries in said dictionary entry store (9). comprises hypertext links pointing to individual attached, and said dictionary access information out when said dictionary access information is extracting entries and storing the entries are carried 7. The method of claim 6, wherein said steps of

by the entries. out when the user selects character strings defined extracting entries and storing the entries are carried The method of claim 6, wherein said steps of

dictionary (10). in said dictionary entry store from said electronic commands for obtaining entries not already present said dictionary entry store, and dictionary look-up hypertext links pointing to entries already present in said dictionary access information comprises tionary access information is attached, wherein of checking said dictionary entry store (9) when dic-The method of claim 8, comprising the further step

step of attaching dictionary access information. text links to other electronic documents, before said of removing, from said electronic document, hyper-10. The method of claim 1, comprising the further step

11. The method of claim 1, comprising the further steps

of said items in said electronic document havdisplaying a menu, when the user selects one other documents; and electronic document having hypertext links to attaching menu information to items in said

linked by a hypertext link. access to a document to which said item is entries, as well as allowing the user to select strings in said item for display of their dictionary menu allowing the user to select character ing hypertext links to other documents, said

strings defined in said electronic dictionary (5, 10, access information is attached only to character 12. The method of claim 1, wherein said dictionary

.(21,01 string not defined in said electronic dictionary (5. tronic dictionary, if the user selects a character string selected by the user is not found in the elecof displaying a message stating that the character 13. The method of claim 1, comprising the further step

of keeping first records indicating how frequently 14. The method of claim 1, comprising the further step

> mation without displaying said dictionary cate presence of said dictionary access inforcharacter strings being visibly marked to indidictionary access information attached, said displaying said electronic document with said

acter string. tion is attached, said entry defining said charstring to which said dictionary access informaary (5, 10, 15), if the user selects a character displaying an entry from an electronic dictionaccess information itself; and

The method of claim 1, comprising the further steps

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access mode; and item enabling the user to select a dictionaryadding to said electronic document a control

said steps of attaching dictionary information attached; wherein control item, but without said dictionary access so displaying said electronic document with said

user selects said dictionary-access mode. information attached are carried out when the tronic document with said dictionary access access information and displaying said elec-

The method of claim 2, comprising the further steps .ε

said dictionary-access mode is selected again. said dictionary-access-ready document store if dictionary access information attached from retrieving said electronic document with said tionary-access-ready document store (6); and tionary access information attached in a dicstoring said electronic document with said dic-

said electronic dictionary. comprises hypertext links pointing to said entries in documents, and said dictionary access information individually retrieved by hypertext links from other enabling entries in said electronic dictionary to be tionary (5) comprises hypertext link information The method of claim 1, wherein said electronic dic-

cuting one of said commands. from said electronic dictionary is carried out by exetionary (10), and said step of displaying an entry ing up said character strings in said electronic dicaccess information comprises commands for look-5. The method of claim 1, wherein said dictionary

The method of claim 1, comprising the further steps

storing the entries thus extracted in a dictionary ary (10); and extracting entries from said electronic diction-

an electronic dictionary (5, 10, 15) coupled to said client device, having a plurality of entries stored on an electronically accessible medium;

a dictionary linker (4) coupled to said client device, for attaching dictionary access information to character strings in an electronic docurent displayed by said client device, responsive to a command received by said client device to information causing said client device to retrieve and display an entry from said electriners and display an entry from said electronic dictionary when the user selects a chartonic dictionary when the user selects a character string to which said dictionary access information is attached.

- 23. The system of claim 22 wherein, when said dictionary access inforary linker (4) attaches said dictionary access information to character strings in said electronic document, said client device (1) displays said electronic document with the character strings to which tronic document with the character strings to which said dictionary access information is attached visitionary access information is present, without displaying said dictionary access information itself.
- 24. The system of claim 22, further comprising a dictionary-access-ready document store (6), coupled to said dictionary linker (4), for storing electronic documents together with dictionary access information attached thereto by said dictionary linker.
- document server (2) coupled between said dient device (1) and said dictionary linker (4), for supplydevice (1) and said dictionary linker (4), for supplying said electronic documents to said client device, activating said dictionary linker responsive to said command, receiving said dictionary secess information from said client device when the user selects a character string to which said dictionary access information is attached, obtaining said entry, and supplying said entry to said client device.
- 26. The system of claim 25, wherein said electronic dictionary (5) has hypertext link information enabling said entries to be retrieved from hypertext documents, and said dictionary access information comprises hypertext links pointing to the entries in said electronic dictionary.
- 27. The system of claim 25, also comprising a dictionary entry extractor (8) coupled to said electronic dictionary (10), for extracting entries from said electronic dictionary.
- 28. The system of claim 27, wherein said dictionary access information comprises commands causing said linked document server (2) to activate said dictionary entry extractor (8).

different character strings with attached dictionary access information have been selected by the user.

- 15. The method of claim 14 wherein, in said step of displaying said electronic document with said dictionary access information attached, said character strings are displayed in different ways responsive to said first records.
- 16. The method of claim 14, comprising the further step of deciding, according to said first records, whether to attach said dictionary access information to the individual character strings in said electronic dictionary.
- 17. The method of claim 14, comprising the further step of keeping second records indicating have been disquently different character strings have been displayed with attached dictionary access information
- 18. The method of claim 17 wherein, in said step of displaying said electronic document with said character ary access information attached, said character strings are displayed in different ways responsive to said first records and said second records.
- 19. The method of claim 17, comprising the further step of deciding, according to said first records and said second records, whether to attach said dictionary access information to the individual character strings in said electronic dictionary.
- 20. The method of claim 19, wherein said first records comprise first counts indicating numbers of times respective character strings have been looked up, said second records comprise second counts indicating numbers of times said dictionary access information has been attached to respective character strings, and said step of deciding comprises acter strings, and said step of deciding comprises the further steps of:

calculating a ratio of one of said first records to one of said second counts; comparing said ratio with a first threshold; and comparing said one of said second counts with

21. The method of claim 20, wherein said dictionary access information is attached when said ratio exceeds said first threshold, and said dictionary access information is also attached when said one of said second counts does not exceed said second threshold.

a second threshold.

22. A document display system having a client device (1) for displaying electronic documents to a user, receiving commands from the user, and enabling the user to select character strings in said electronic documents, comprising:

user selects said item. said client device displays said menu when the

- said electronic documents. dictionary access information to character strings in ments before said dictionary linker attaches said for removing hypertext links from electronic docuremover (17) coupled to said dictionary linker (4), 34. The system of claim 22, further comprising a link
- tronic dictionary (5, 10, 15). tion only to character strings defined in said eleclinker (4) attaches said dictionary access informa-35. The system of claim 22, wherein said didionary
- string not defined in said electronic dictionary (5, entry is present, if the user selects a character (1) displays a message indicating that no dictionary 36. The system of claim 22, wherein said client device
- said dictionary access information was attached. selections, by the user, of character strings to which tionary linker (4), for keeping records about past tionary access tabulator (18) coupled to said dic-37. The system of claim 22, further comprising a dic-
- zrıngs. said dictionary access information to said character access tabulator (18) in deciding whether to attach linker (4) uses the records kept by said dictionary 38. The system of claim 37, wherein said dictionary
- been previously selected. user how frequently said character strings have character strings in different ways indicating to the tion causing said client device (1) to display said access tabulator (18) by attaching attribute informamation, uses the records kept by said dictionary linker (4), in attaching said dictionary access infor-39. The system of claim 37, wherein said dictionary
- strings are selected by the user. first counts indicating how frequently said character by said dictionary access tabulator (18) comprises 40. The system of claim 37, wherein the records kept
- been attached to said character strings. quently said dictionary access information has for keeping second counts indicating how fretabulator (19) coupled to said dictionary linker (4), 41. The system of claim 40, further comprising a tag
- access information to said character strings. counts in deciding whether to attach said dictionary linker (4) uses said first counts and said second 42. The system of claim 41, wherein said dictionary
- 43. The system of claim 42, further comprising:

- tronic dictionary (10). from said dictionary entry extractor from said elecextractor (8), for storing the entries extracted by ary entry store (9) coupled to said dictionary entry 29. The system of daim 27, also comprising a diction-
- sponding entry in said dictionary entry store. to said client device (1), and stores said corresaid electronic dictionary (10), supplies said entry entry extractor extracts a corresponding entry from stored in said dictionary entry store, said dictionary store, and if a corresponding entry is not already corresponding entry from said dictionary entry (9), said dictionary entry extractor (8) obtains said entry is already stored in said dictionary entry store access information is attached, if a corresponding selects a character string to which dictionary 30. The system of claim 29 wherein, when the user
- stored in said dictionary entry store. brises a hypertext link to the corresponding entry wherein said dictionary access information comalready stored in said dictionary entry store, and dictionary entry store (9), unless said entry is tronic dictionary (10) and stores said entry in said (8) extracts a corresponding entry from said electo a character string, said dictionary entry extractor ary linker (4) attaches dictionary access information 31. The system of daim 29 wherein, when said diction-
- dictionary entry store. responding entry is not already stored in said vating said dictionary entry extractor (8), if said cordictionary access information a command for actiin said dictionary entry store, and attaches as said store, it said corresponding entry is already stored to a corresponding entry in said dictionary entry tionary access information a hypertext link pointing said dictionary entry store (9), attaches as said dicto a character string, said dictionary linker checks ary linker (4) attaches dictionary access information 32. The system of daim 29 wherein, when said diction-
- wherein: generator (16) coupled to said dictionary linker (4), 33. The system of claim 22, further comprising a menu
- access for character strings in said item; link and also allowing the user to select dictionary an electronic document indicated by said hypertext allowing the user to select retrieval and display of generates menu information for displaying a menu said menu generator, and said menu generator is already attached, said dictionary linear activates linker encounters an item to which a hypertext link dictionary access information, if said dictionary when said dictionary linker is attaching said

mation to said item; and said dictionary linker attaches said menu infor-

a ratio calculator (20) coupled to said dictionary linker (4), for calculating ratios of said first counts to said second counts; wherein said dictionary linker uses said ratios and said second counts in deciding whether to attach said dictionary access information to said character strings.

- 44. The system of claim 43, wherein said dictionary linker (4) compares said ratios with a first threshold, so compares said second counts with a second threshold, and attaches said dictionary access information to character strings the ratios of which exceed said first threshold, and to character strings the second counts of which do not exceed said sec. 15 ond threshold.
- 45. An electronic dictionary (5), comprising an electronic dictionary accessible medium on which are stored a plurality of dictionary entries, and on which is also stored hypertext link information enabling the dictionary entries to be individually retrieved by hypertionary entries to be individually retrieved by hypertext links from electronic documents.
- 46. The electronic dictionary (5) of claim 45, wherein ss said hypertext link information conforms to a hypertext markup language.
- 47. The electronic dictionary (5) of claim 45, wherein said hypertext link information comprises an opening tag preceding each dictionary entry in said electronic dictionary, and a dosing tag following each dictionary entry in said electronic dictionary.
- 48. The electronic dictionary (5) of claim 47, wherein as each said opening tag specifies a character string defined by the dictionary entry following said opening tag.
- 49. The electronic dictionary (5) of claim 45, wherein 40 one of said dictionary entries is an unknown-character-string entry comprising a message that can be displayed to inform a user who tries to look up a character string that the character string is not defined in the electronic dictionary.

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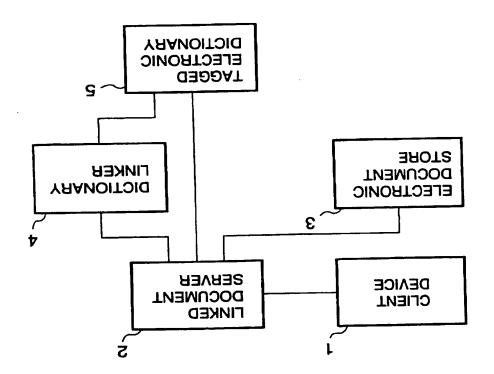
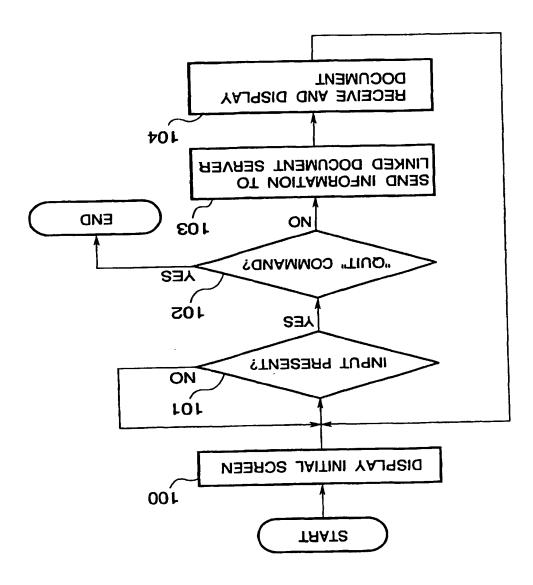


FIG.2





BN2DOCID: <Eb 0810234V5 |->

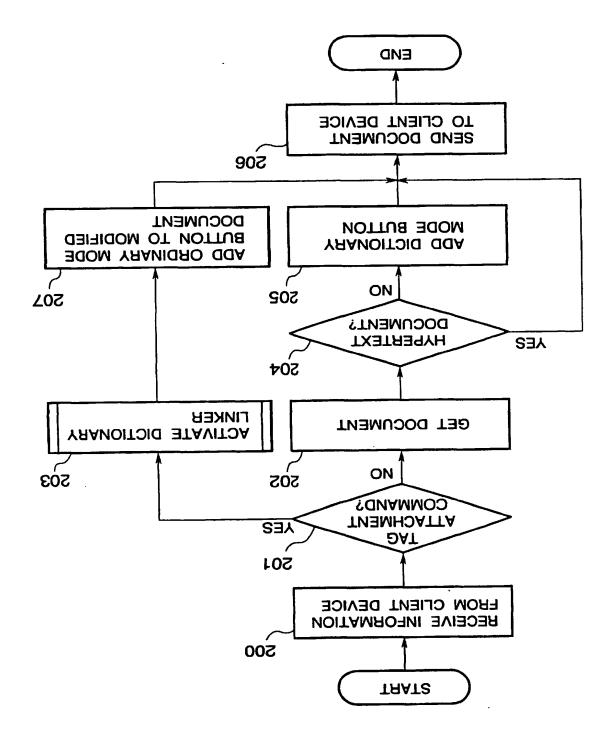
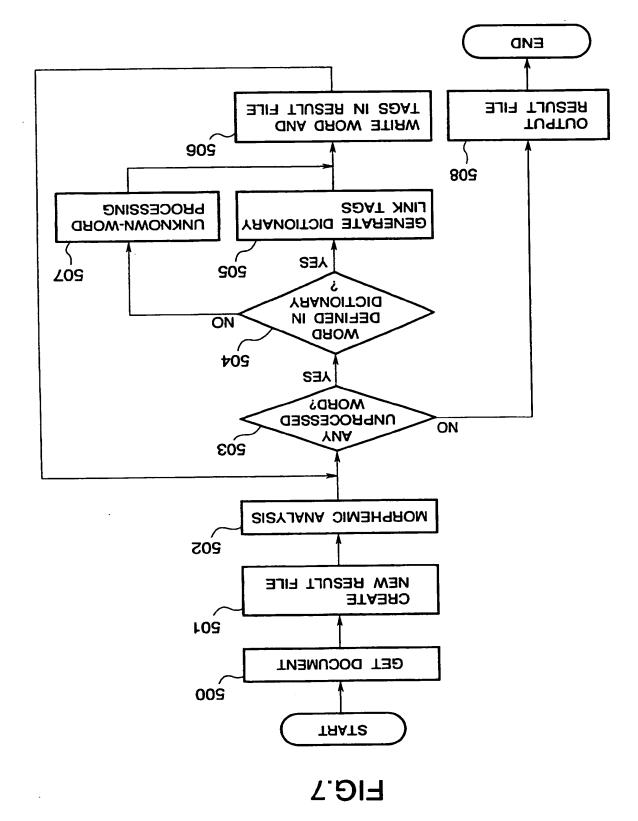


FIG.6

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8.DI4

```
< A\ > secucionas < "estorences < \A\ > secucionas < "estorences < \A\ >
               < A/ > 128v < "task\#Q3est" = 73AH A >
                   < A/ > no < "no#Q3est" = 33AH A >
              < A / > Watb < "wated = "taged" = 199H A >
                 < A \ HREF = "tagED#we" > We < \A>
```

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< A/ > sezuorenoses < "especial de la consection de la co
                                                                                                                                                                                                                                       < A/ > no < "no#GBest" = 43AH A >
                                                                                                                                                                         < A > A > draw < "tagED#draw" > 4 >
                                                                                                                                                                                                                         < A \ > 9W < "9w#QBeb" = 7A >
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FIG.10

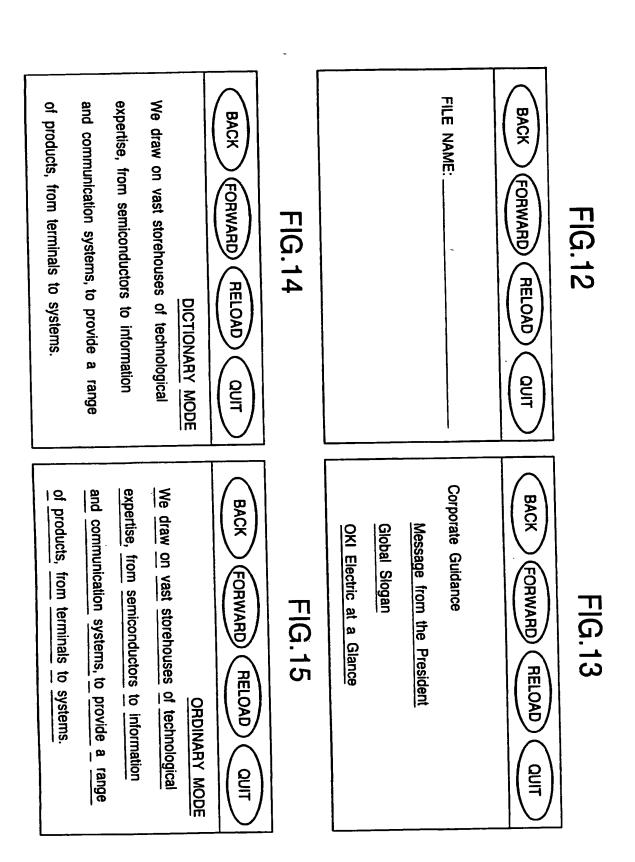
。入せまいあこ)書名お語単のチ < N NAME = "UNKNOWN_WORDS" >

< \/>

BN2DOCID: <Eb 0810234V5"1">

FIG.11

- < A \ > \ TagEF = "tagED#UNKNOWN_WORDS" > vast < \ \ > < A\ > no < "no#GBest" = FFH A > < A | HREF = "tagED#draw" > draw < /A > < A\ > 9W < "9w#Q3pst" = 73AH A >
- < A / > secucionses < "estorehouses < //> "tageD#storehouses < //> < /



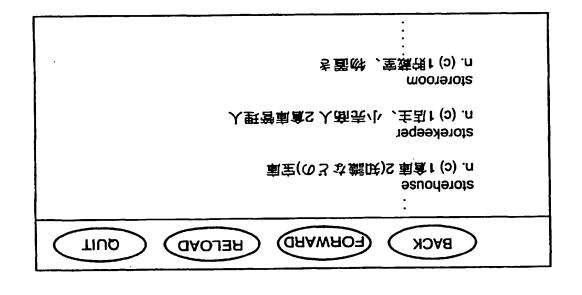


FIG.17

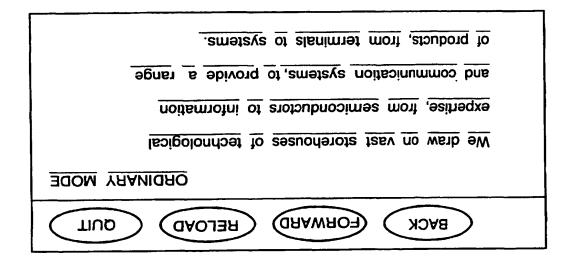


FIG.18

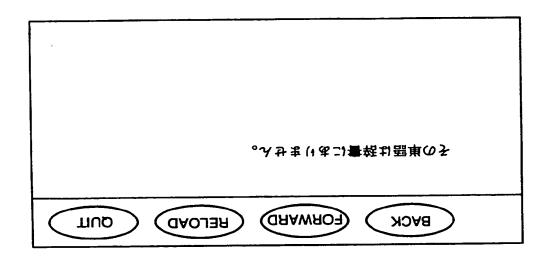
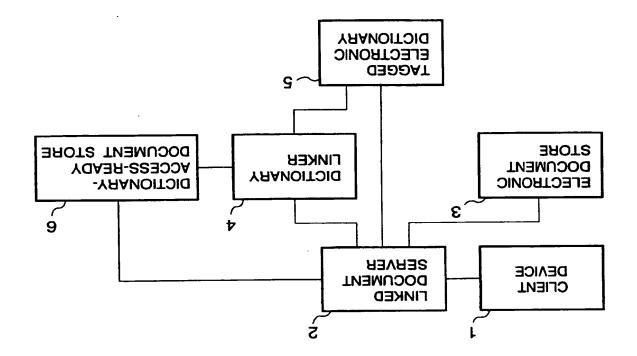
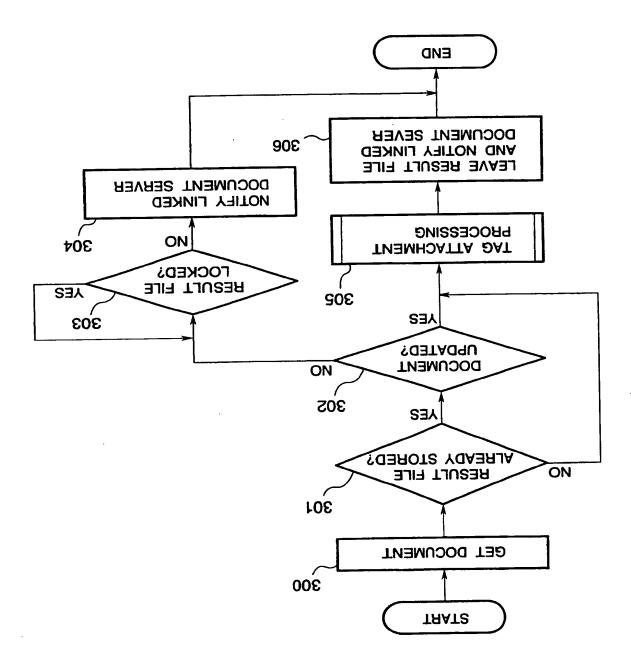
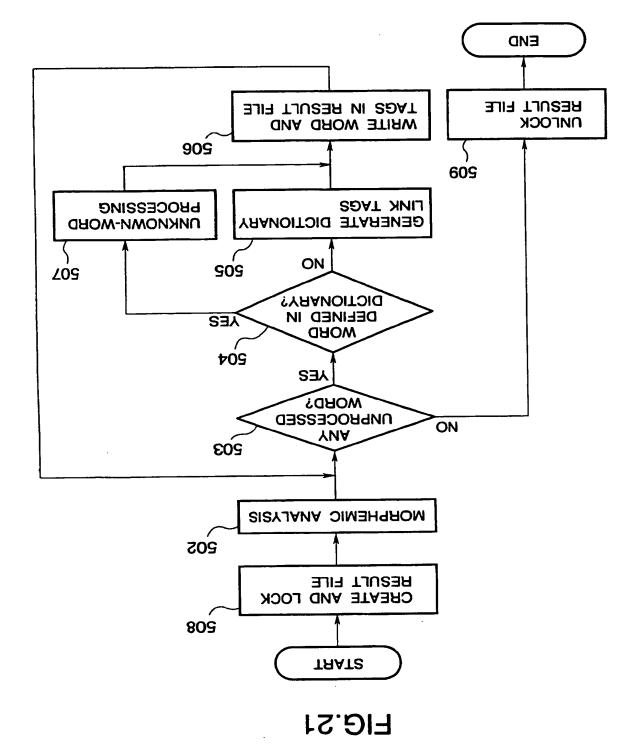


FIG.19







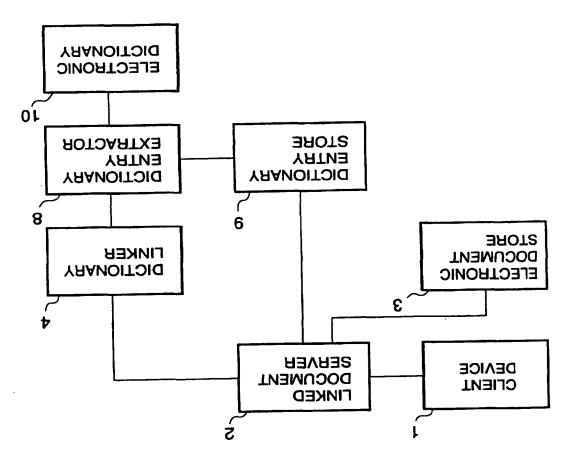
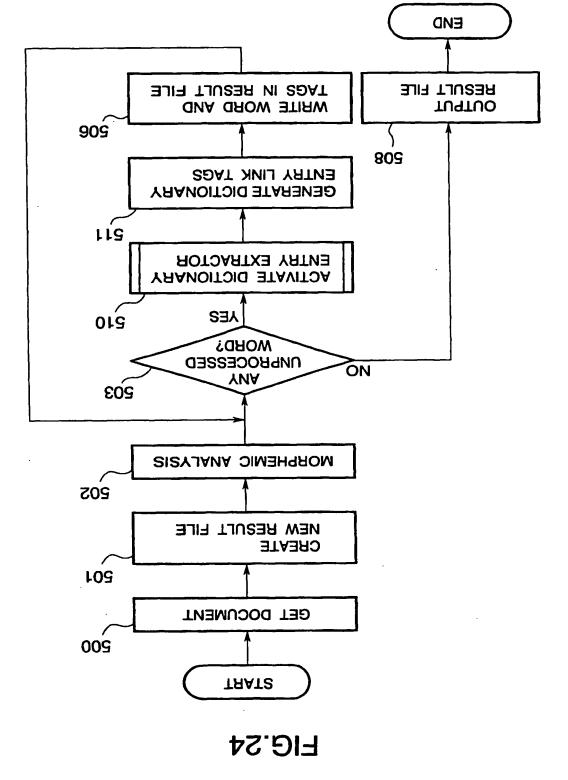


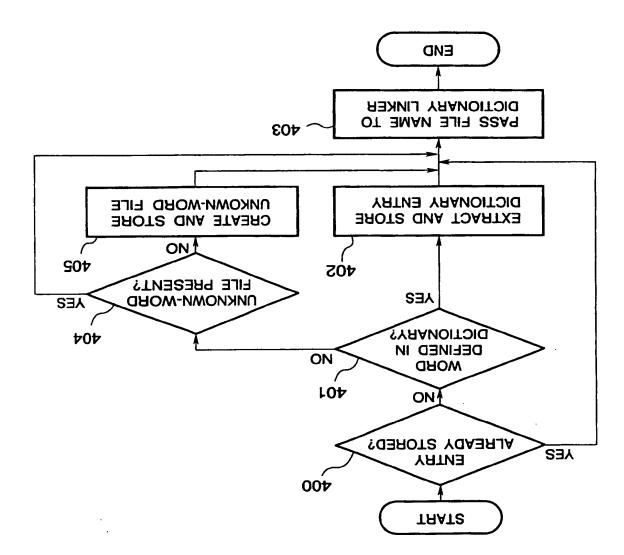
FIG.23

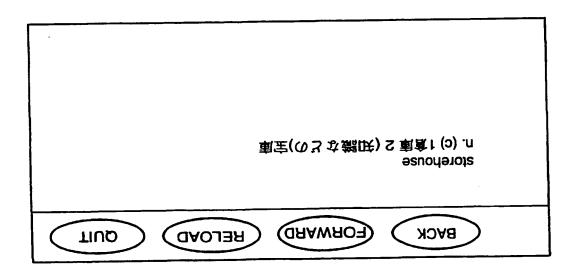
storehouse n. (c) 1倉庫 2 (知識などの)宝庫 storekeeper n. (c) 1店主、小売商人2倉庫管理人 コージの1店主、小売商人2倉庫管理人

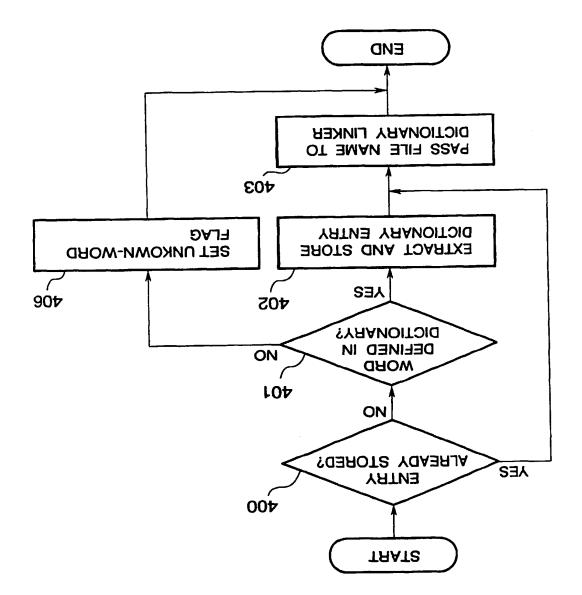
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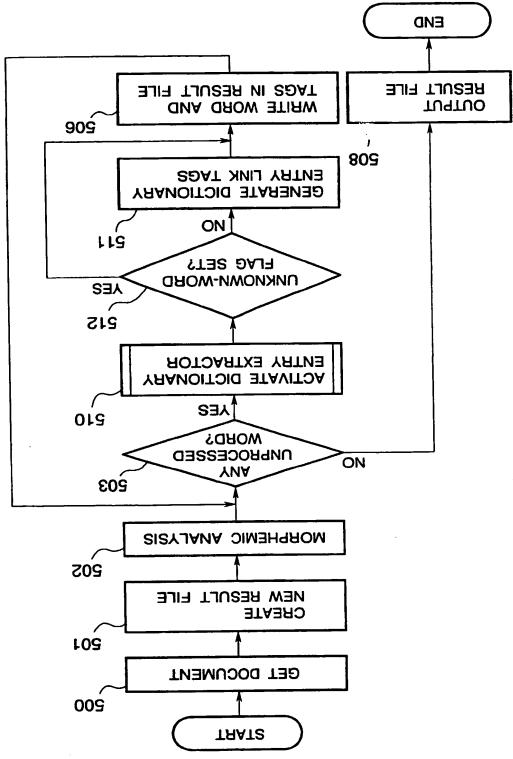


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- < A HREF = "\dickeep\draw" > draw < A>
- < A HREF = "\dickeep\on" > on < \A>
- < A HREF = "\dickeep\vast" > vast < \A >
- < A \ HREF = "\dickeep\storehouse" > storehouses < \A >









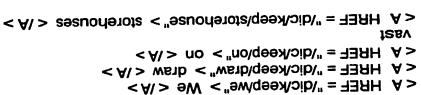
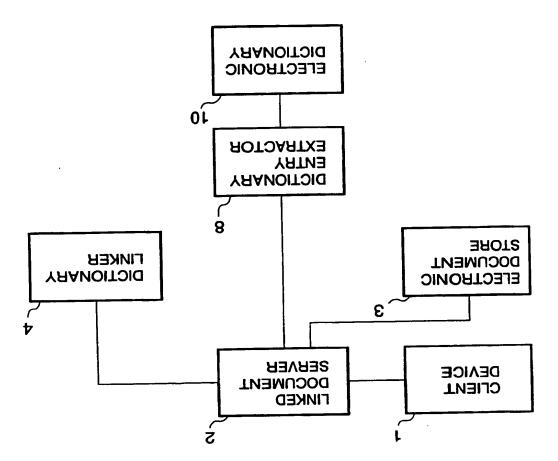
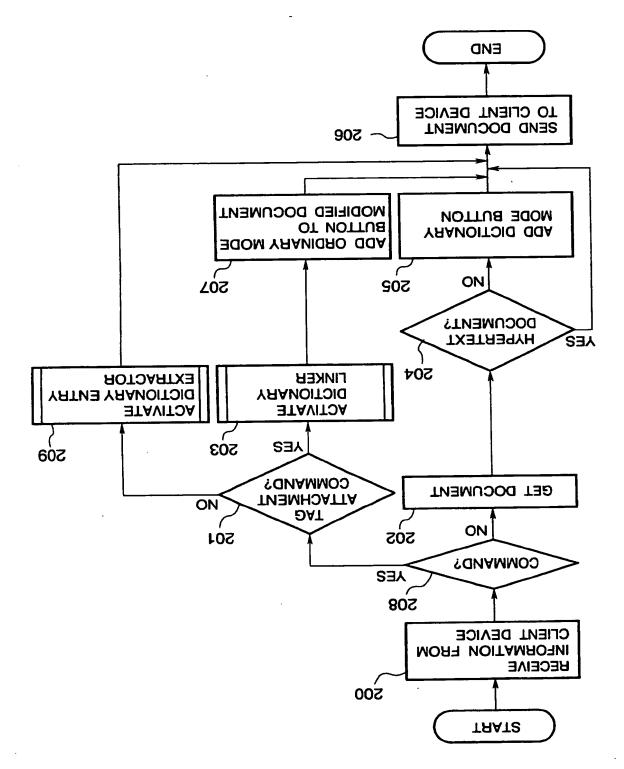


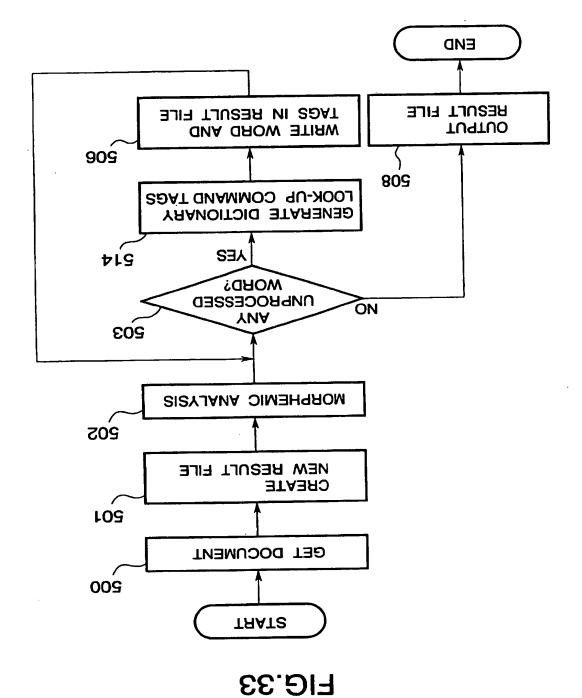
FIG.31



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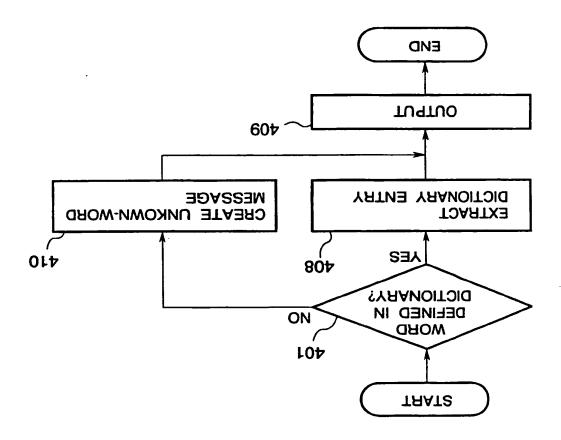
EIG.32

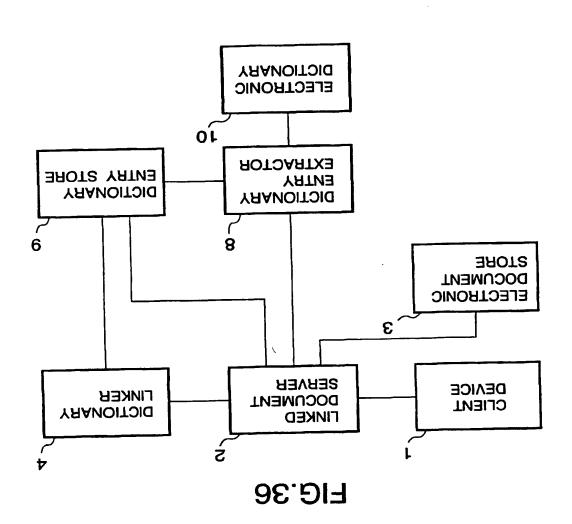


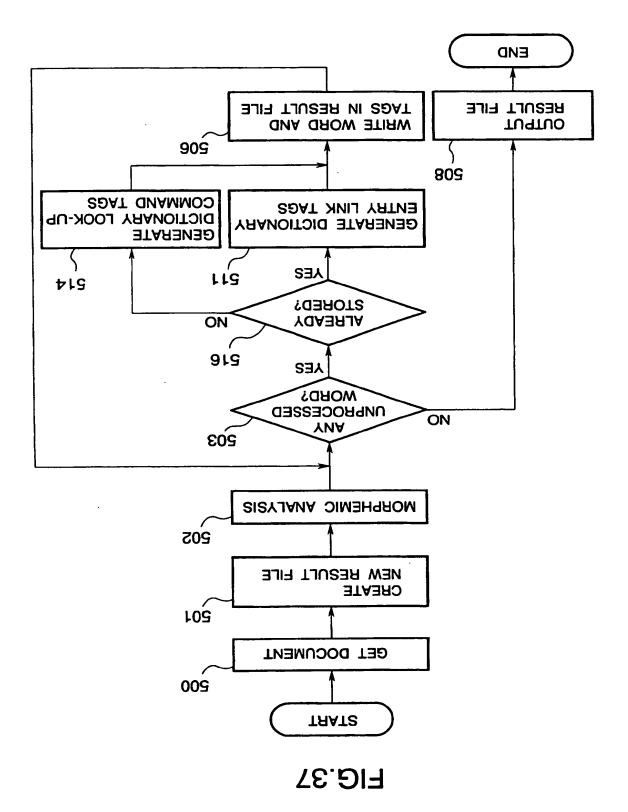


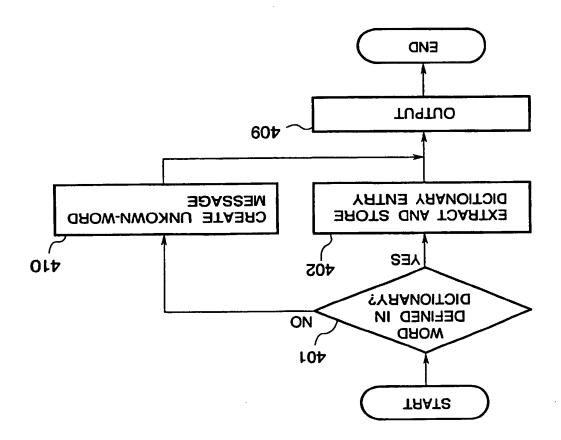
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< A HREF = "\cgi-bin\pick_dic?we" > We < \A >
< A HREF = "\cgi-bin\pick_dic?on" > on < \A >
< A HREF = "\cgi-bin\pick_dic?vast" > vast < \A >
< A HREF = "\cgi-bin\pick_dic?vast" > vast < \A >
< A HREF = "\cgi-bin\pick_dic?vast" > vast < \A >
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EIG.35









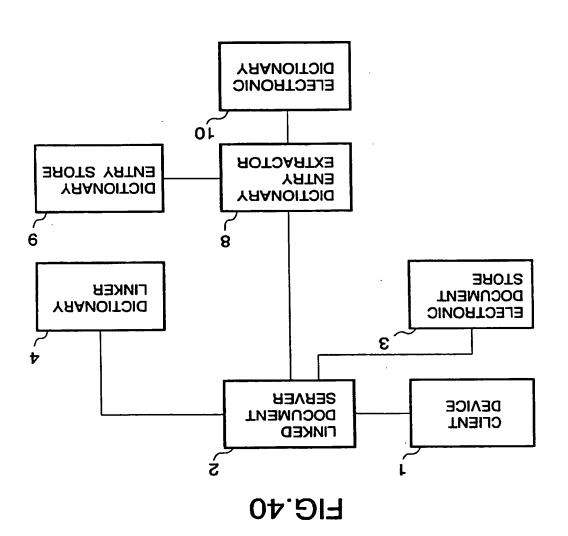
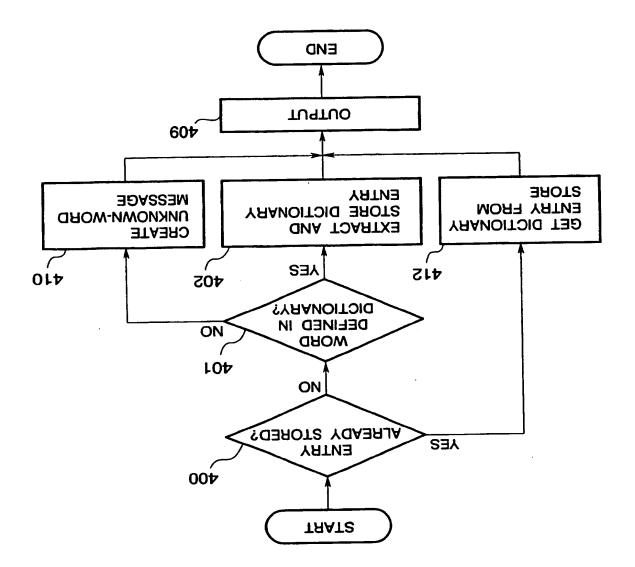


FIG.41



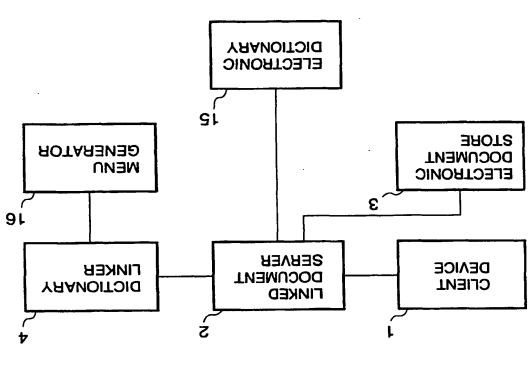
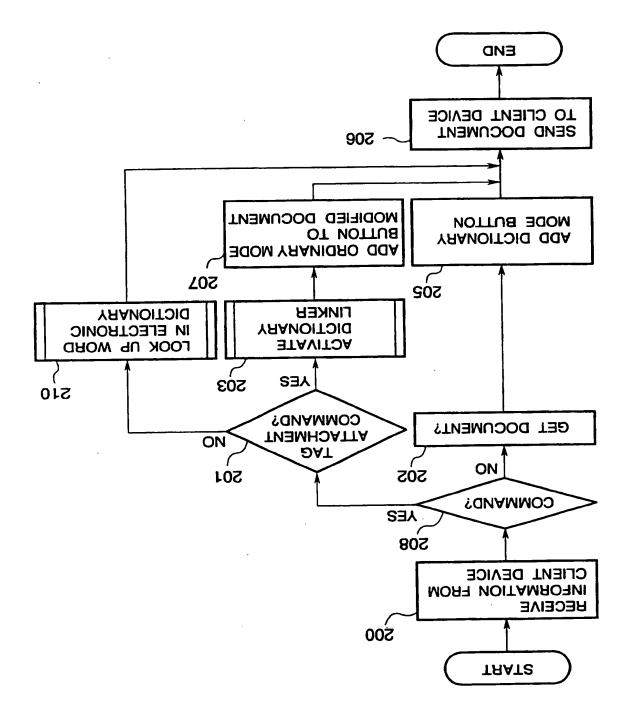
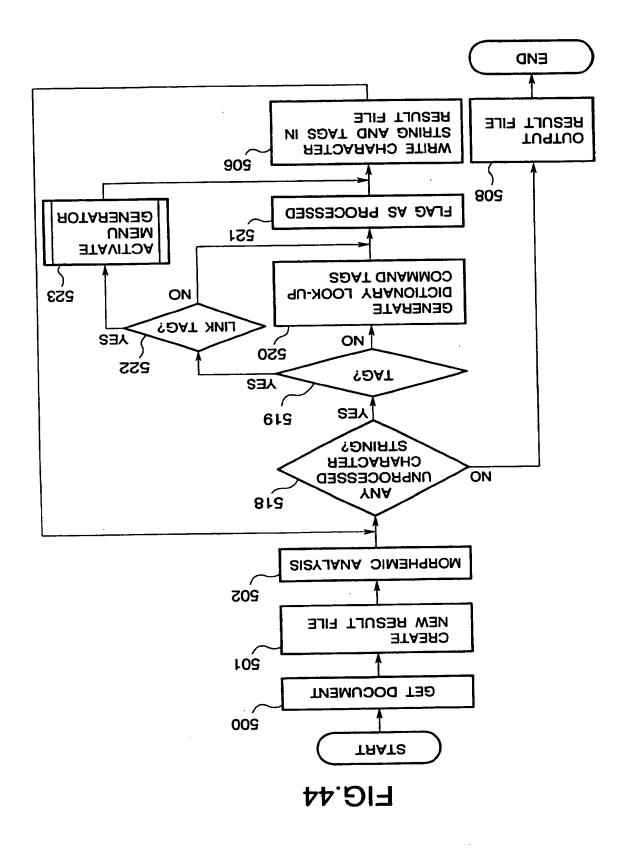
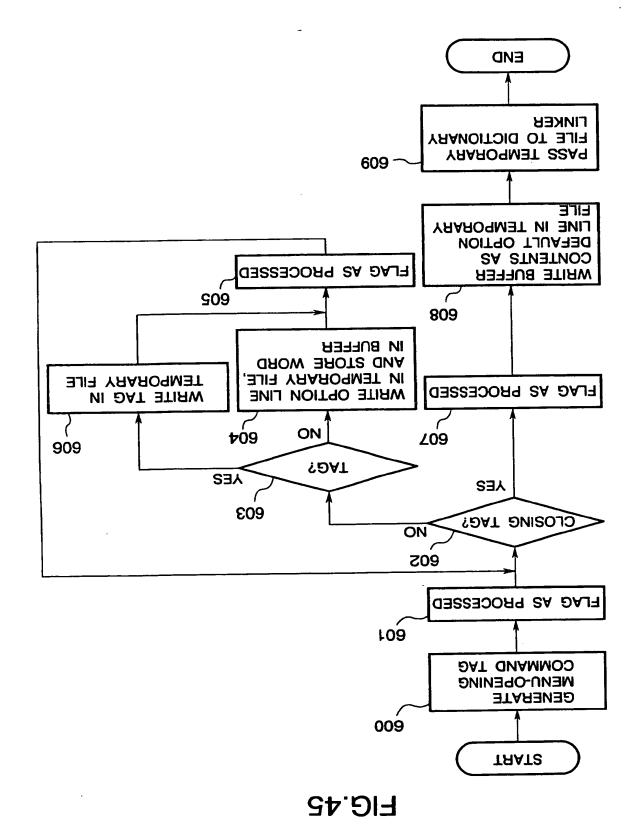


FIG.42

Eb 0 810 234 VS



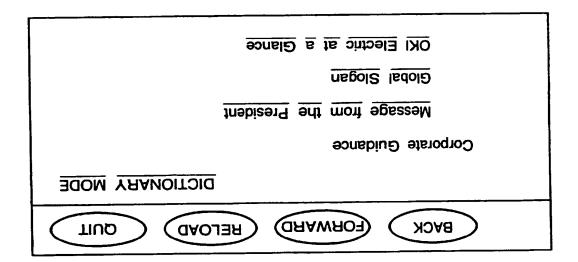




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Corporate Glance < BR >

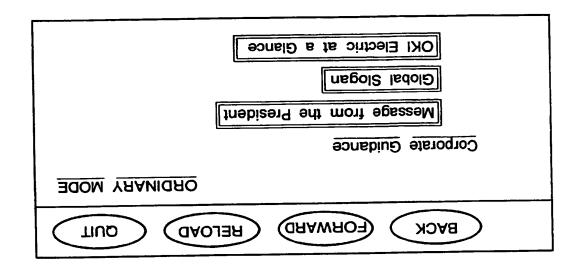
Corporate Glance < BR >

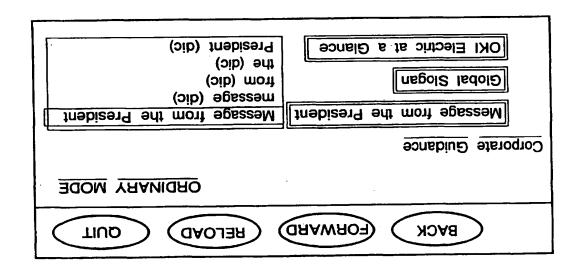
CDD > < A HREF = "nessage" > Message from the President < \mathbb{N} > CDD > < A HREF = "slogan" > Global Slogan < \mathbb{N} > CDD > < A HREF = "slogan" > Global Slogan < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF = "glance" > OKI Electric at a Glance < \mathbb{N} > CDD > < A HREF > CDD > < A
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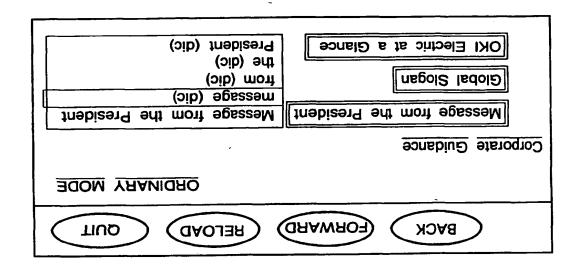


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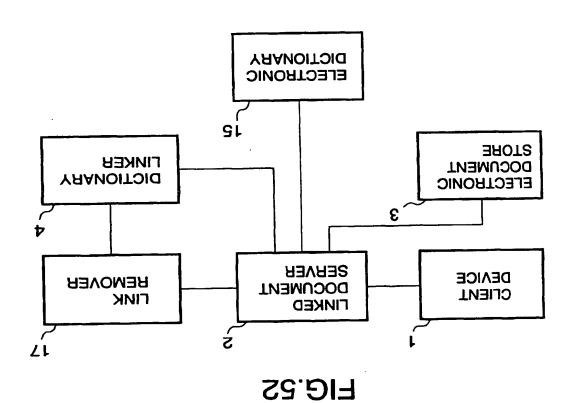
A HREF = "guidance" > ORDINARY MODE < /A >
A HREF = "(cgi-bin/look_up?corporate" > Corporate < /A >
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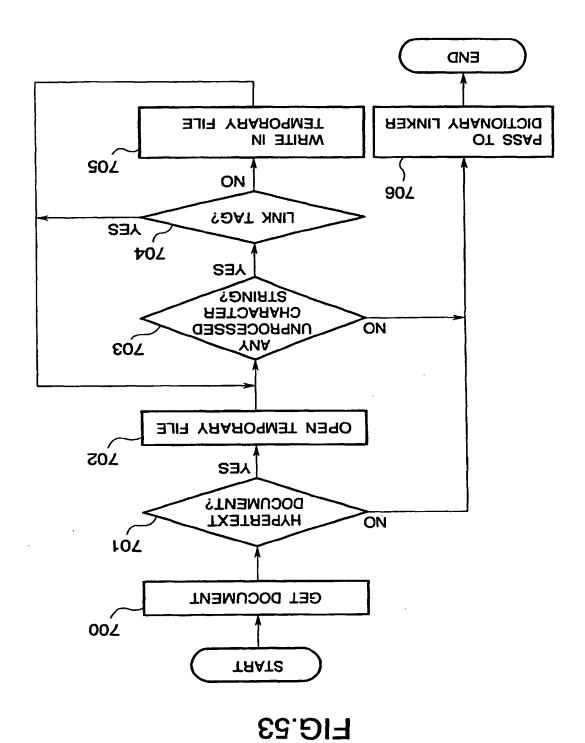




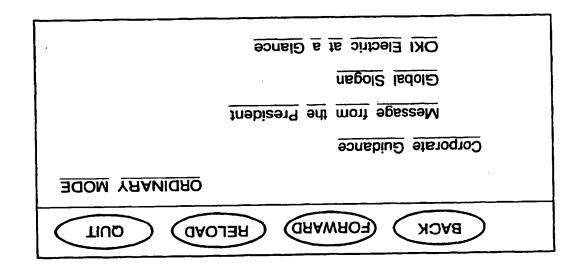
Eb 0 810 234 VS



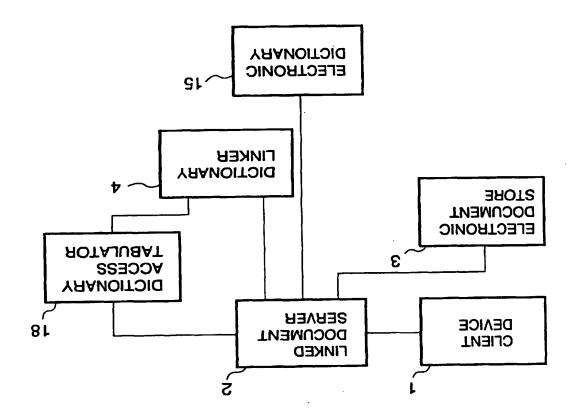
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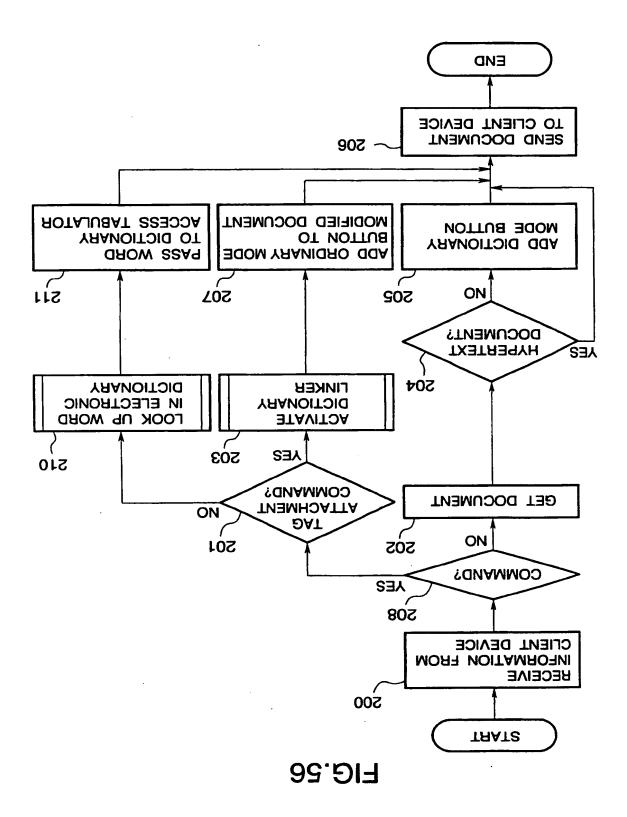


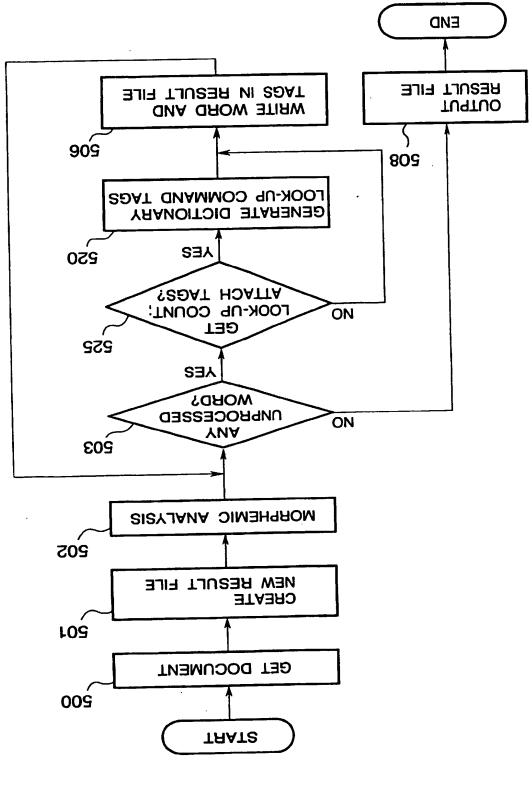
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FIG.59

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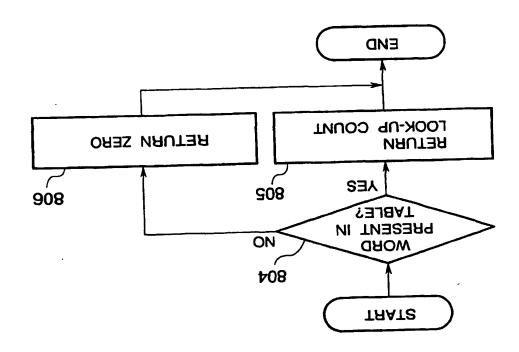
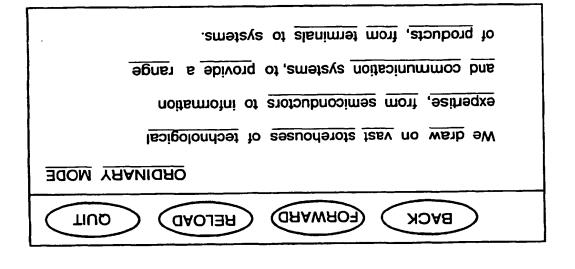


FIG.61

< A HREF = "slogan" > ORDINARY MODE < /A >

< A HREF = "/cgi-bin/look_up?vast" > vast < /A >

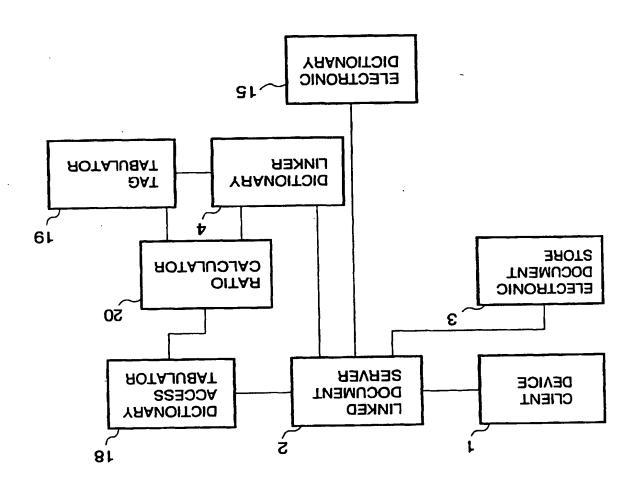
< A HREF = "/cgi-bin/look_up?vast" > vast < /A >
< A HREF = "/cgi-bin/look_up?vast" > vast < /A >



EIG.63

< TNO1/>

FIG.64



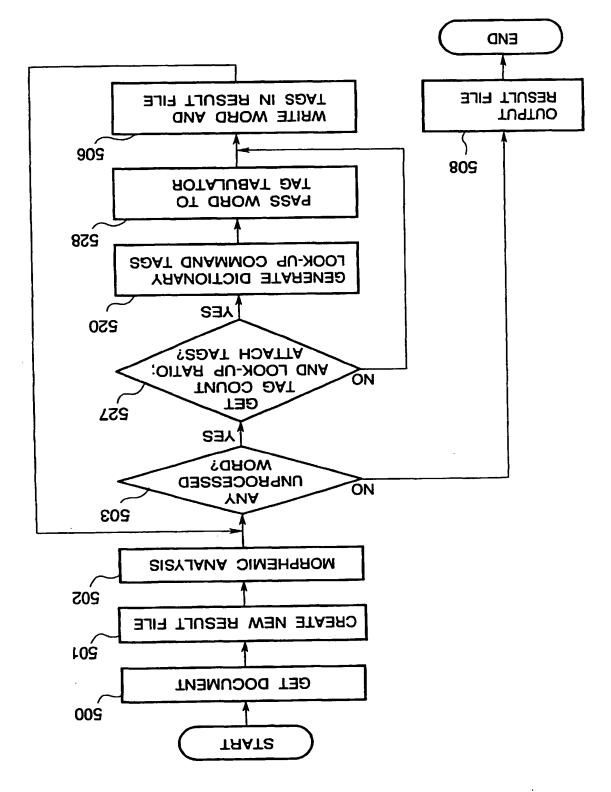
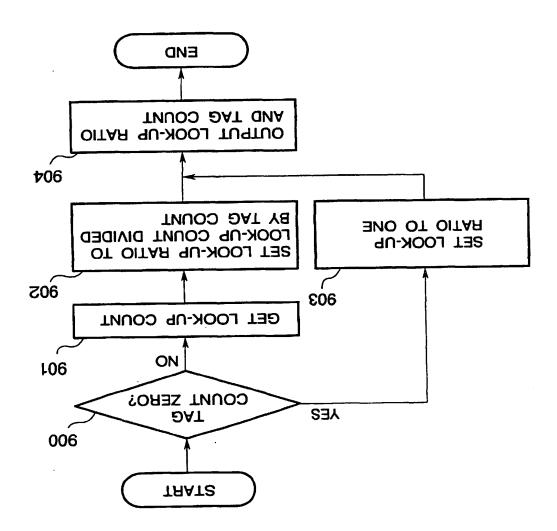


FIG: 66



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(88) Date of publication A3: ST\0000S in Itelia 0000.20.20

(43) Date of publication AS: 03.12.1997 Bulletin 1997/49

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(72) Inventor: Ikeno, Atsushi 1-chome, Minato-ku, Tokyo (JP)

(74) Representative: Kirschner, Klaus Dieter, Dipl.-Phys. Schneiders & Behrendt Rechtsanwälte - Patentanwälte Sollner Strasse 38 81479 München (DE)

(84) Designated Contracting States: DE FR GB

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8e337811 9L 3661.30.£1
8e367811 9L 3661.30.£1

(71) Applicant:

Oki Electric Industry Co., Ltd. Tokyo (JP)

(54) Document display system and electronic dictionary

tents of an electronic document. If the user requests dictionary access, the electronic document. If the user requests dictionary access, the electronic document is modified by attaching invisible dictionary access information to displayed, the words to which the dictionary access information is attached being visibly marked. If the user information is attached being visibly marked. If the user selects a word to which dictionary access information is attached, an electronic dictionary entry for the word is attached, an electronic dictionary entry for the word is attached, an electronic dictionary entry for the word is automatically retrieved and displayed.

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TECHNICAL FIELDS SEARCHED (Int.CI.6)	84-34 22, 22, 11, 9-11 34-35 35-24 15, 22, 1	JUNE BULLETIN,US, IBM 11564 - Column 6, line 34 * - Column 33, line 8 * - Column 33, line 8 * - Column 33, line 8 * - Column 34, line 8 * - Column 35, line 8 * DIA LINK GENERATION" S4553 OSURE BULLETIN,US, IBM DIA LINK GENERATION" S4553 OSURE BULLETIN,US, IBM DIA LINK GENERATION" S4553 OSURE BULLETIN,US, IBM DIA LINK GENERATION" S4553 DOSURE BULLETIN,US, IBM DIA LINK GENERATION" S4553	IBM TECHNICAL DISCLO CORP. NEW YORK, vol. 37, no. 3, 1 Ms page 511-512 XP00044 * the whole document toolumn 59, line 15 * column 6, line 15 * column 89, line 15 * figures 4A,8,22, 18 * figures 4A,8,22, 18 * column 10, line 15 * column 29, line 15 * column 10, line 15 * column 29, line 15 * column 29, line 15 * column 20, line 15 * column 30, line 15 * column 20, line 15 * column 30, line 15 * column 40, line 15 * column 50,	∀
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Application Number 67 10 7176

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The members are as contained in the European Patent Office EDP file on

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